

*(Photo by Putnam & Valentine)*

THE GRAND VIEW AT SUNSET

# technology review

Published by MIT

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# The Technology Review

VOL. VII.

JANUARY, 1905

No. 1.

## MAPPING THE GRAND CANYON.\*

With the topographer on the United States Geological Survey, things are very much as with the army or navy officer. He seldom plans ahead more than six months. There is no telling where he will be after that time. The nature of his work demands his periodic return to headquarters at Washington, yet he never gets entirely settled there. He is ever ready to start off again at short notice, and proceed *via the shortest route* to some obscure, wondrously named place at the other end of the United States, there to resume the life nomadic. And, be it said, he dearly loves the same. Four months in the office are generally enough to make him sigh once more for a sniff of keen Western air, and to set him dreaming of breezy all-day rides over endless prairies, of desperate scrabbles above timber line, of scorching afternoons on a glaring desert. The infatuation is one few can shake off.

Having successfully wrestled with and conquered in turn three tall mountain ranges in the West, the writer next found himself commissioned with the survey of a hole in the ground. Not a mere depression of moderate extent, but a horrible, ragged rent, a chasm two hundred miles long, ten miles wide, and a full mile deep,—in fact, the Grand Canyon itself.

Perhaps there be some whose mental atlas is somewhat vague and non-committal regarding the location of this our greatest natural wonder. True, more than one State in the West boasts of a Grand Canyon, just as every other county in New England claims a Muddy Pond and a Beaver Brook. But *the* Grand Canyon, the glorious *forte-fortissimo* finale to the thousand-mile rhapsody of

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gorges and canyons of the Colorado River, is the only one your geography has no excuse to ignore. It is big enough to figure even on a Mercator's projection of the whole world.

Three years ago a spur line was built from the Santa Fé Railroad to the south rim of the Grand Canyon. Forthwith tourists poured in from every part of the world. Hotels arose like mushrooms, roads were cut through the dense forests of the plateau, trails were blasted down into the chasm. The demands for a modern and detailed map became urgent, from various quarters, for the most diverse purposes; and the Geological Survey thereupon detailed a party to commence work on the most important section of the Grand Canyon, that embracing its most superb scenery.

Late in March, 1902, "outfitting" was begun at Williams, Ariz., the starting-point of the Grand Canyon Railroad. Do not imagine there was a bustling scene of mustering with the thronging of many men. Modern mapping methods require no large field parties. Really, mapping is a two-men's job; and, had the topographer and his rodman the time to cook their meals, attend to the stock, and haul their provisions, there would be no need of further help. Often, indeed, the two do perform all these duties; for it is not always expedient to take the whole outfit along, up mountains or to other out-of-the-way places, where a few days will clean up the task. It is then that the adventures of a "side trip" may be tasted,—the sort of trip that is pre-eminently calculated to bring out in each man all his greatness or smallness.

Four individuals met at Williams; to wit, a topographer, a rodman, a professional camp cook, and a teamster, the latter in charge of a carload of camp equipage, wagons, and animals, all government property, and well worn in many a rough campaign. In a few hours, camp went up on the outskirts of the town, and the stars and stripes floated from the office tent. It was snowing hard, and kept at it for three days, accumulating a foot and a half, to the boundless joy of Arizona; but "outfitting" went on just the same.\*

\*The northern part of Arizona consists of high plateaus with a temperate climate. Williams has an elevation of 6,750 feet above sea-level. It lies thirty-two miles west of Flagstaff, where the Lowell Observatory is located.





The Colorado River in the Granite Gorge, here 1300 feet deep

The horses and mules were shod, and extra shoes fitted for them. The wagons were overhauled, and tires reset. In camp, men were busy mending harness, patching tents, painting stadia-rods, and rigging up pack saddles. The chief's activities ranged all the way from the testing of instruments to the designing of special mess-chests for the pack outfit and the recording of the brands of his animals. Also, being quartermaster, purchasing agent, and disbursing clerk all in one, it devolved upon him to spend part of his time discussing groceries with the groceryman and hardware with the hardware-man, and to devote his evenings to the consequent bills, vouchers, expense accounts, and other inevitable red tape.

When, finally, the party entrained for the Grand Canyon, it carried an "all-round" outfit, one that could be mobilized by wagon or by pack train over any kind of ground,—a camp that could be made comfortable in the hottest July or in zero weather, one that was adaptable both to the forest and to the desert and that could look respectable when set up at a tourist resort.

A dull gray snow-cloud hung over the landscape when we stepped out on the rim for a first peep at the great chasm. There it lay,—a scene of sullen, stony grimness, overwhelming by its vastness, baffling with its chaotic profusion of chiselled detail, but utterly devoid of charm. It did not capture our hearts, as the Rockies had done with their superb snow-flecked peaks, mirrored in romantic forest-fringed lakes. To the topographer's mind this was the superlative of all Arizona box-canyons, the biggest, deepest, and most dreaded of them all. It promised trouble,—heaps of it. But, then, one should not see the Grand Canyon at dawn with a snow sky. Even the Yosemite Valley looks dismal in that setting. Little did we anticipate how its sublime power was to grow upon us, until at the end of two years it seemed a hardship to leave it for the commonplace world of man.

Without a word we severally slunk back to our tent by the railroad track,—hastily pitched there by the light of a brakeman's lantern about midnight,—and set about liberating our poor horses from the stuffy box-car in which they had stood all night. Soon they were tied under the trees, contentedly munching in their nose-

bags. The cook tent was up and breakfast cooking, while sundry fragments of wagons, boxes, sacks, and barrels, and many bales of hay, were still issuing from the car. And the tourists stood about in gaping wonderment, watching these strange ruffians in khaki and corduroy, and the hustling cook in apron and leggings, and almost missed their train.



A cosy camp in the Coconino Forest

For several months the party worked along the south rim of the Grand Canyon, camping in various cosy nooks of the Coconino forest. Just two factors determined the selection of a camping place,—convenient proximity to the work and sufficient grass for the stock. Water there was none. It was hauled in barrels from the railroad, the only source of supply for the hotels and the rest of the population on the rim. And the railroad brought this water at great expense from points sixty, eighty, and frequently more than a hundred miles away.\* Truly, Arizona is well named!

\* The drinking water usually came from Del Rio, at the head of the Verde River, 120 miles from Grand Canyon Station.

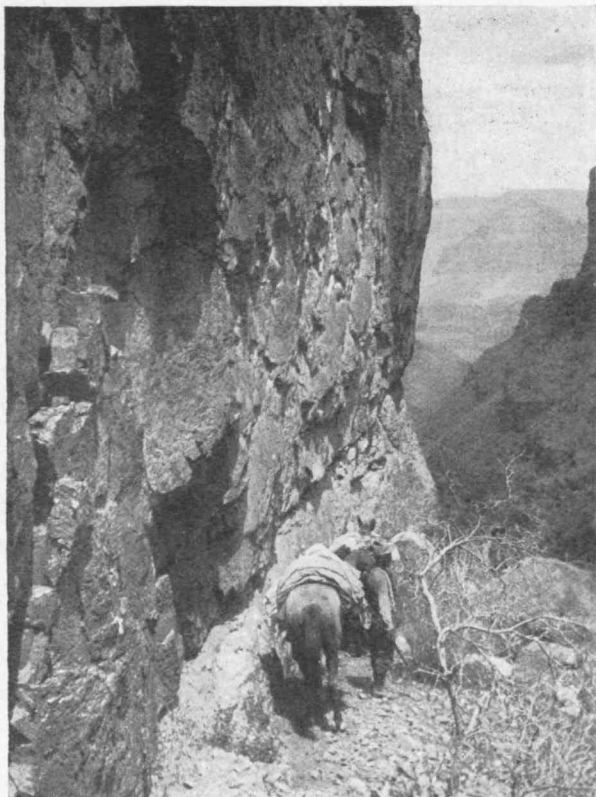
But the Colorado River? Well, it makes little difference whether there be water in the bottom of that mile-deep chasm or not. One might as well make a descent to the Styx for a cupful. Besides, its water is not worth journeying for, being scarcely potable and of a color and consistency much like cocoa.

For a space we helped ourselves to the snowdrifts, and the animals did the same; but after their disappearance—through evaporation mostly—the water team made daily trips. Further east we had the benefit of an artificial reservoir, or tank, as it is called in the West, dug years ago by enterprising stockmen. We stayed with it until it was reduced to a quivering mass of greenish slime. The traditional Arizona cloud-bursts, which were to replenish it, did not materialize that summer.

As for the grass, according to Eastern notions there was none; but, from the Arizona standpoint, it was thick among the trees of this peculiar open forest. The animals were turned out on it every night, hopped, and did well. Only it required an expert at tracking to find them again in the morning, usually scattered and a mile or two from camp. They somehow developed a cunning habit of standing still when sought for, so that their stock bells hung silent without a tinkle. Sallying forth with the gray of dawn, the teamster generally managed to drive them in before breakfast.

About seven o'clock we would start out to work, mounted as a rule, with the plane-table, instruments, and tripod on a pack animal. A large sun umbrella, a pair of field-glasses, note-books, lunches, and a noon feed for the animals formed the rest of the pack. A heavy canvas sheet covered the whole, neatly tucked in all around, so that nothing could catch in the stiff, unyielding Arizona vegetation; and over all went a stout lash-rope twisted in that mysterious tangle known as the diamond hitch. An axe, two canteens with water, wetted on the outside, and a camera were carried on our saddles,—occasionally also a carbine. Usually from one to three stations were occupied during the day. The topography of the Grand Canyon proved to be next to ideal for plane-table methods, and the great bulk of the mapping was done by intersection work from well-chosen stations on the rim. Some of these commanded

such extensive panoramas that six and seven days were necessary to complete the work at any one of them. Thousands of intersections and hundreds of elevations from one instrument station,—there is no other place on earth where it can be done.



Under the Red Wall, on the Mystic Spring Trail

By midsummer the work along the south rim was finished, and we were ready to begin operations on the north side. The problem before us now was, How to get across? Few people have need to cross the dreaded Colorado River anywhere along its course, let alone through the Grand Canyon. From the bridge of the Denver & Rio Grande Railroad in Utah to "The Needles" on the

Santa Fé route there is a stretch of some seven hundred miles of river without a single bridge and with but two ferries. The nearest one of these, Lee's Ferry, the sole gateway between Arizona and Utah, is situated at the head of Marble Canyon. It meant to us a three-hundred-mile detour, for the most part through the Painted Desert. A nearer but even worse reputed route lay via the Mystic Spring Trail, across the very heart of the Grand Canyon, and some twenty-five miles west of our scene of work. It was nothing more than an ancient Pai-Ute pack trail, kept in an indifferent state of repair by a local prospector. A decrepit row-boat constituted the sole means of transportation across the river. This route we selected.

Speedily the wagon outfit was converted into a pack outfit. The number of pack-loads was carefully estimated, additional animals were hired, rations were figured down to a nicety. All articles that could be dispensed with were stored. No longer were we to indulge in the luxury of folding cots and camp-chairs, of a neatly covered dining-table, and a commodious wash-tub. Henceforth it meant a bed on the hard ground, and the top of a mess-chest for a table, picnic style. Candles were to be the sole illuminant, for kerosene is strictly taboo on a pack train. Three light tents were taken. Tent poles could be made when needed. Pack covers would do for tent floors, and no one was expected to encumber the expedition with voluminous bags of clothing.

Thus cut down to a minimum, the party began its descent into the pit. Every man walked. Every one of the ten pack and riding saddles carried a load. The trail, though steep and full of awkward turns, offered no serious obstacles; and by two o'clock we were busily engaged in lugging our paraphernalia on our own backs down the last hundred feet of ragged cliffs to the water's edge.

The boat, of course, lay on the wrong side of the river; and the two swimmers of the party had to plunge in and get it. The swim, far from refreshing in that tepid flood, left us as red as Indians. Incidentally, it was useful in establishing the most discouraging fact, that there was no shelving shore on the rocky south side, and that the landing of animals on our return would thereby be rendered



Swimming the animals across the river

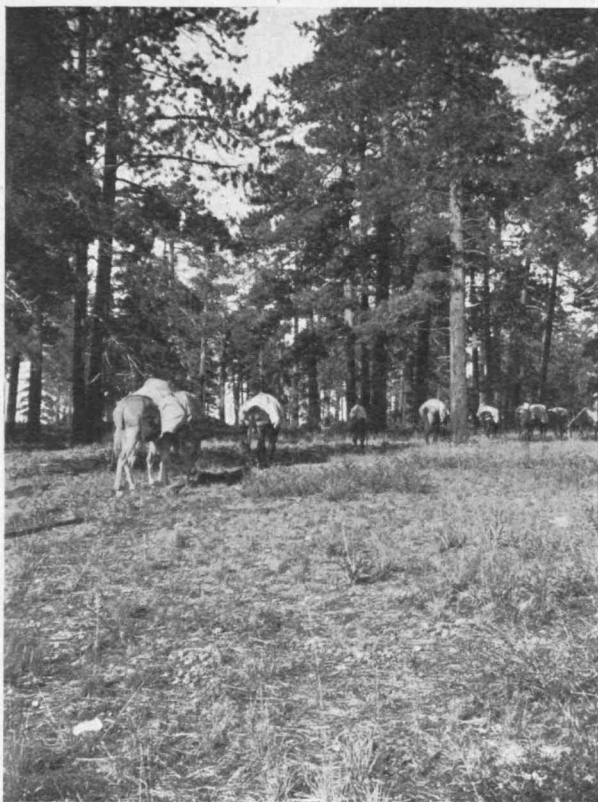
next to impossible. No one ever dreams of taking stock across the Grand Canyon by this route, so we had the pleasure of discovering these things ourselves. Fortunately, there was a small sandy bay on the north shore, so that by dexterous manœuvering we could manage to land our animals there safely. They were swum across behind the boat, one at a time. To get them into the water, they were first led down over the cliffs to a small rocky terrace, whose edge was even with the flood. A long rope was fastened to the halter, its free end being thrown to the boat, a safe distance out from shore. Then a sudden jerk on the rope and a simultaneous shove from behind sent the unsuspecting beast head over heels into deep water. Each one went clean under, only to bob up again, wild-eyed and snorting. Not the least of our troubles was to keep the frantic animals from out-swimming the rustic, hulking craft, which was as unwieldy as an ironclad; but luck was with us, and, even if there were some narrow escapes, we had the satisfaction that evening of seeing the whole bunch, hale and hearty, on the north shore.

Not less than two long days were we toiling up to the rim of the Kaibab Plateau. Ours was the first party over the trail that year, and in a desperate state we found it. Again and again the pack train would come to a halt, while those in front, with their bare hands—we had no tools—labored to get some washed-out place in a passable condition. Accidents were the order of the day. Not all of our animals were fit for such excessive up-and-down work; and many of them did take sudden tumbles and backward summersaults, resulting in painful injury to limb and damage to packs and a deal of extra labor. Strangely enough, none was killed; but toward the end more than one horse was so completely worn out that he could barely take the last high "jump-ups." But one pack there was which sailed through it all, serene and undisturbed, although unguided and left to the management of its sagacious, long-eared bearer; and that was the instrument pack. Truly, here was the right mule in the right place.

It was nearly sunset when we emerged upon the flat surface of the plateau, and suddenly found ourselves in a glorious forest, where the thermometer ranged some thirty degrees lower than in



the canyon, and where the grass grew as on a lawn. Half an hour through its idyllic shady aisles in the keen breezes of an altitude of eight thousand dissolved all memories of the toilsome furnace through which we had struggled for three days.



Through the shady aisles of the Kaibab Plateau

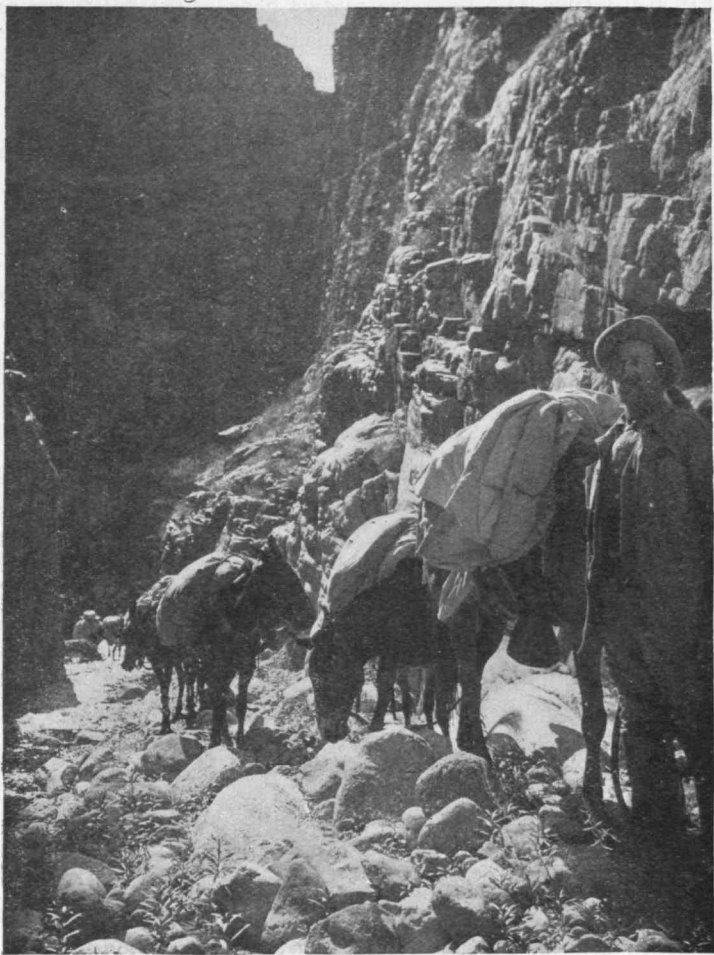
And now began a season of nomadic rambling which it is difficult for city folk to realize. Scarcely ever were all the men together. Twice a month the packer would ride to town with a pack animal for mail and provisions. Town (*i.e.*, Kanab, Utah), being a matter of seventy to eighty miles distant, according to our location, required three days to reach, so that the envoy was often gone

a week. In the meanwhile the chief and his assistants would operate from a "dry" side camp on the canyon rim, where the cook would appear at intervals with a pack-load of water. The main camp, located near some spring or pond, and the bunch of animals took care of themselves while the cook was on his errand. So, for that matter, did the side camp while we were out at work. Danger of thieves? Outside of two lone forest rangers there was not a living soul within thirty miles of us. If you want solitude, north of the Grand Canyon you will find it. And at Kanab! There are grown-ups who have never heard a locomotive whistle. Yet from our camps on the rim we could watch the smoke of the railroad train on the south side. Through the instrument we could make out clusters of tourists leaning on the railing in front of the hotel—only ten miles away!

Autumn came, and with it came winter. The mercury dropped to 18° or 16° F. every night. Little snow flurries whitened the ground at intervals. The cowboys came down from Utah, and drove their cattle northward to milder climes. It was high time for us to vanish, too, and avoid getting trapped in a heavy snowfall. How we wished we could avoid that ugly crossing on the Mystic Spring trail!

Then, lo and behold! there stood before us two men from the south side, well known to us, who said they had crossed the chasm by a new trail. They pointed down Bright Angel Canyon to a dim game trail scarcely noticeable from the rim. Then and there did we resolve to return "via" Bright Angel Canyon. Forsooth, it could be no worse than the way we had come, even if there had never been a pack train through it. The cowboys laughed at us. The rangers shook their heads. There was a superstitious dread among them all of this Bright Angel Canyon. But one fine morning in November saw us winding down that new trail; and that night we were camping snugly in the bosom of Bright Angel Canyon, while up on the Kaibab it savagely stormed and snowed.

The details of that journey, as well as the trip through the tortuous granite gorge of Bright Angel Creek, demand a fuller description than can be given here. It requires a Stewart Edward White to do the thing justice. But, rough and hazardous as it was, we voted it a glorious experience.



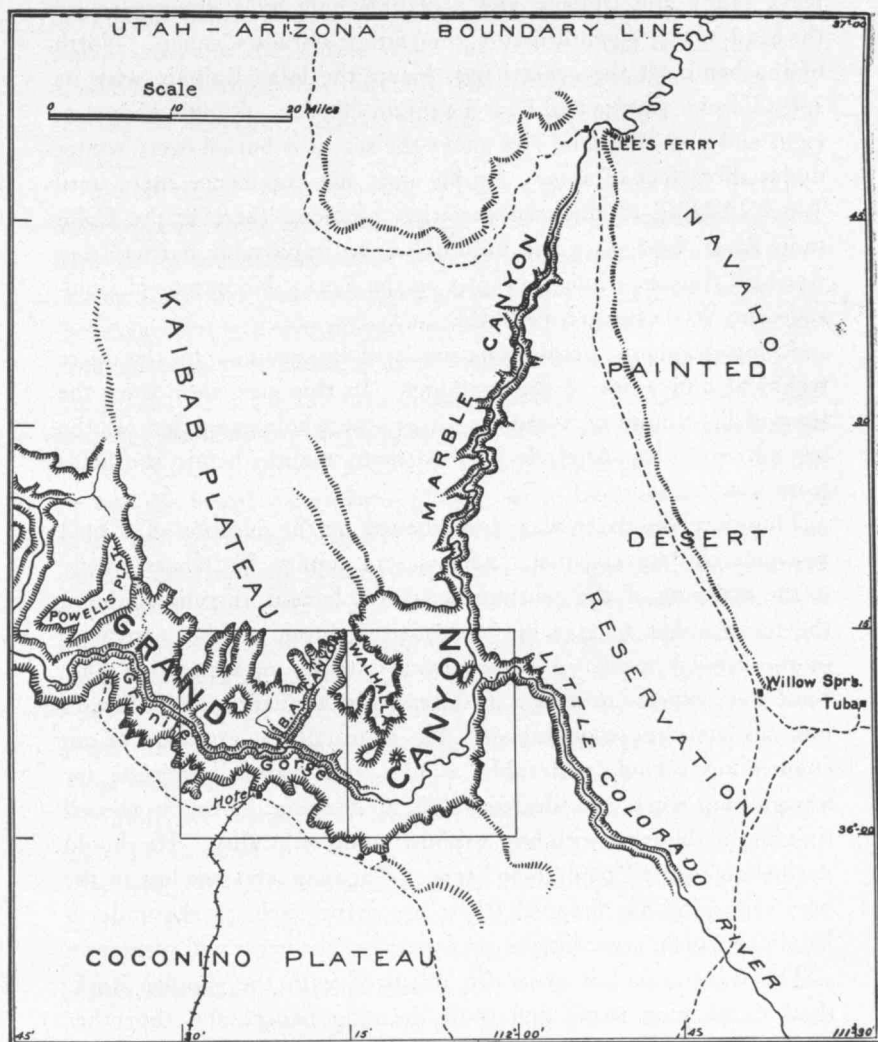
Traveling up Bright Angel Canyon — five miles of darkness

The crossing of the river was accomplished without any difficulty; and the animals, this time, could scarcely be restrained from plunging in pell-mell. The next day saw us back at the hotel, camping on the same spot we had occupied seven months before. A general snow setting in then, field-work for that year was considered closed.

Strenuous and eventful as the first campaign had been, it was altogether put in the shade by that of the second year. Seldom is a topographic party called upon to face such a variety of problems and to adapt itself to such a diversity of conditions as that which in 1903 undertook the mapping of the great bend of the Grand Canyon. For the great bend, the "Grand View" of the tourist, is a unique piece of geography, a law unto itself. It is there that the unexpected happens, and happens with a vengeance. After persistently burrowing southward for sixty miles into a flat desert gently tilting in a northerly direction, the Colorado, in a singularly irresponsible mood, runs afoul of the east flank of the ponderous Kaibab Plateau, lacerating it into magnificent chaos. And then, as if unsatisfied with such mere child-play, the river swings deliberately westward for the middle of all the remaining high plateaus of north-western Arizona. Hence the Grand Canyon.

Grouped about the bend, within a few miles of each other, lie regions so utterly different from one another, in climate, vegetation, altitude, and general aspect, that they might easily be conceived hundreds of miles apart. Not only had each of these to be studied, to be dealt with by a special method, to be traversed in a different manner, but each had to be attacked at a certain time of the year, under proper seasonal conditions.

The bottom of the canyon, with its South-Arizona cactus vegetation, ranging only about twenty-five hundred feet above sea-level, is not unlike the lower regions in summer: it cannot be operated in to advantage except during the colder months. The Coconino Plateau, south of the bend, with its expanse of dense pinyon pine and scrubby cedar, is delightful in summer; but its elevation of seven thousand feet renders it too cold in winter. Toward the northeast it drops off stepwise to the Painted Desert (about six thousand



Sketch map of the upper Grand Canyon, showing area mapped in 1902 to 1904

feet), sandy and treeless, and accessible only by a detour around the head of that gigantic fissure, the Little Colorado Canyon. North of the bend, on the other hand, looms the lofty Kaibab, with its splendid pine forests and high mountain climate. Ranging between eight and nine thousand feet above the sea, it is buried every winter under three feet of snow. Spring does not commence there until June. Adding to the transportation problem, there is the Colorado River, bridgeless and unfordable, an impassable barrier from April till August, while the snows on the Rocky Mountains of Colorado and Wyoming are melting.

A topographer's perplexities are seldom confined to the mere technical difficulties of the mapping. In this case they were the least of his troubles. Needless to say, the whole campaign for the second season was carefully planned many months before the field-work was begun.

This time the party was strengthened by the addition of a field assistant, or "traverseman," who was to confine his labors chiefly to the mapping of the gently undulating plateaus, thereby enabling the topographer to give his undivided attention to the intricacies of the canyon itself. A traverseman is really an apprentice who, some day, expects to pass a civil service examination and blossom into an assistant topographer. He is usually a graduate of an engineering school, preferably a man with natural aptitude for topographic work and decided skill in drawing. Also, it is well that he should bring with him a robust bump of locality. He should not belong to the "tenderfoot" type. The man who gets lost in the very region he has mapped (there are many such) works under a handicap which, according to our experience, he never will surmount.

The traverseman is generally intrusted with the simpler work, that of mapping roads and trails, locating houses and the other works of man. As his experience and skill grow, he is given more difficult work, contouring along his traverse lines, and finally the mapping of small areas. He is virtually second in command, and at times may be required to "run the outfit" in the chief's absence. In the West he moves on horseback, carrying his plane-table and alidade with him; or, if there be many roads, he sits in a bouncing

buckboard behind a pair of mules. His rodman is mounted, and usually stays in the saddle while the rod is "up." In the East conditions are somewhat different, and the traverseman drives prosaically in a spring buggy, counting the revolutions of the front wheel.

At first things went smoothly. Both topographer and traverseman worked from the same camp, a commodious, pleasant one, with all the conveniences that a wagon can carry. July was spent on the Coconino Plateau, and each day meant long rides through the exasperating dense pinyon forests. They teach you a certain nimbleness in the saddle, a most desirable accomplishment. Failure to acquire it means torn clothing, smears of sticky rosin, and frequent dismounting to pick up your hat. As the summer wore on, the work progressed eastward, around the great bend, and one by one the broad steps of the plateau were descended. More and more arid grew the country, and sparser the timber. Soon we were so far from the nearest water that the camp and animals had to be supplied by means of a large "tank wagon," not unlike those used for sprinkling the streets in cities. It was specially constructed for this work, and was hauled over many a mile of desperate wagon trail. All through that summer the animals were watered but once a day, in the evening, unless subjected to unusually hard work. They remained in the best of trim.

Finally, we reached the long, low, desert-like tongue between the main canyon and that of the Little Colorado. No road was available here. A minimum outfit was packed to a point near the mouth of the Little Colorado Canyon, on a level with the Painted Desert. So little frequented is this inter-canyon desert that we had no difficulty in picking out every track made in the barren shingle for one year past. There were but two, and they must have been made in winter weather when a light snow was melting. Yet the junction of the two canyons affords a scene which would grace many an artist's canvas, were it more accessible.

As the animals could not be kept here, they were taken back to the base camp. All work was done on foot, and the burning desert atmosphere made it the more arduous. Every second day the packer



would come out with three pack-loads of water, and return the same evening, making a round trip of thirty miles. In the mean while the teamster would be making twenty-five-mile round trips with the tank wagon, to keep the base camp supplied. The cook meted out the water most "judgmatically," and all hands were enjoined to wash no more than strictly necessary.

There was plenty to drink; and, even if at times our mouths were so dry we could not eat our lunches, this first experience of desert life passed by without serious suffering.

The rainy season being over and the river low, we once more prepared to cross the chasm. The first act was the packing of a sectional steel row-boat down to the river, for the spring freshets had made a clean sweep of all the wooden boats in the neighborhood. It was no small feat in the art of packing, and its successful accomplishment was duly shouted through the land.

A few days later the whole party sallied forth on what turned out to be a memorable trip. The object was the great headland of the Kaibab Plateau projecting into the bend of the Grand Canyon; and the route lay up Bright Angel Canyon, the same we had descended so romantically the year before. It was expected that all the work to be done on the headland would be completed in three weeks; and, in view of the great distance to the nearest Mormon settlement to the north, the expedition undertook to carry all the necessary supplies across the chasm. The twelve pack animals started, therefore, heavily loaded; and, as in last year's campaign, the men walked.

Auspicious as was the start, the first day ended in disaster. We had successfully descended to the broad terrace through which the river has cut the famous Granite Gorge and had traversed the better part of the awful trail zigzagging down into the latter, when one of the mules, completely overcome by the heat, the exertion, and the sudden change in altitude, went sprawling down the sheer cliffs. It was absolutely necessary to save the pack; and by hazardous rock-climbing and much patient manœuvring the load was carried back to the trail, and the mule, bleeding and weak, led to the river. All this took much valuable time, and it was nearly





The lowest depth of the Grand Canyon ; crossing a side canyon

four o'clock before the whole pack train emerged upon the broad sand-bar. The night was spent at the river, the boat having been sent over for drinking water from Bright Angel Creek (a mile up stream).

It took all of the next day to cross the Colorado, and a day of arduous toil it was. The little steel boat did wonders. No gallant battleship was ever showered with more praise. For, with a heavier boat, no doubt many a frantic, awkward-swimming Arizona mule would never have reached the other side. As it was, one protesting pony finally had to be abandoned mid-stream, and went head over heels down the great curling rapids below the crossing. The little cockle-shell itself, but for its lightness, would have followed. However, all ended well, even with the pony, which by a miracle got out of it without a scratch.

That same night, camp was made near the mouth of Bright Angel Canyon, but not without further accidents. For one of the agile little mules, clambering up the steep trail fifty feet above the landing, suddenly lost her footing, and, describing a succession of parabolas, disappeared with a tremendous plump, pack and all, under the oily ripples of the Colorado. Quick work with the boat rescued her in the nick of time.

One day of alternate wading and scrambling up Bright Angel Canyon, and another of fierce climbing, brought us to the rim of the plateau. Great was our exultation! From our camp on the neck of the great headland one could look down Bright Angel Canyon and across to the hotel on the south rim,—a gorgeous vista; and, turning east, one faced the Grand Canyon again, its further side bordered by the palisades of the endless Painted Desert. Truly, this was the roof of the world. Nowhere had we seen such overwhelming panoramas. Nor was there ever a more paradisaical land to dwell in. Lovely grassy vales extended like so many avenues through the majestic pine forests. Bands of deer, tame and unsuspecting, assembled in rings to watch us work. No wonder we voted to name this land Walhalla! And we, the only beings holding sway therein,—of course, we were the gods. Of a truth, we *were* masters of all we did survey. One of the would-be gods,



A plane table station on Walhalla

it must be confessed, got ignominiously lost in his domain once, while hunting for fresh meat; for, although the peninsula was only fifteen miles long and nowhere wider than five, it was strangely alike in all its parts.

Our reign was brief, but glorious. It never rained or stormed during those three weeks. The weather was as immaculate as it should be in the abode of the gods. And well it served us; for our rations were limited, and there was no time to waste. Every day we worked (Sundays, too) as long as the sun was in the heavens. Right sorry were we to leave Walhalla, but the "Götterdämmerung" had to come. Besides, we were by that time reduced to three biscuits per day per man (and unlimited venison).

In two days we slid down to the river, where we regaled ourselves on the stores "cached" there, and without a mishap recrossed the Rubicon. But the dreaded Granite Gorge was not to be left behind without levying its toll. The ascent on the south side demoralized the pack train. It seemed as if the mules had agreed to take turns pitching off the trail, and in one place they all had to be unpacked. There was woful destruction in the mess-kit, which at one moment lay thinly distributed over the trail. One of the pets died. Why the others did not no one knows.

A few weeks later we were plodding through the Painted Desert, again with a minimum outfit, cut down regardless of comfort. Only this time transportation was by wagon, for in the desert pack trains are at a discount. Not even had we any saddle animals. For on that one wagon were the supplies for the men and the forage and water for the animals. Therefore, the fewer there were of these, the easier was the problem solved. Most of the way we walked. The length of each day's travel, usually from twenty-five to thirty-five miles, was determined by the location of the watering-places. Each of these was approached with a full supply of water on board, on the supposition that it had dried up. Some had dried up, others contained a thick, repulsive-looking liquid that had to be strained and boiled before it was fit to drink.

On the evening of the fourth day we came upon the lone trading-

post known as Willow Springs. Effusively welcomed by the trader, we camped in the lee of the jagged vermilion cliffs nearby, from whose base issues a clear stream of water, fringed with willows. In perfect harmony with the strong contrasts in the coloration of the landscape seemed the gorgeously attired group of Navahoes playing "monte" on the doorstep of the adobe house. No wonder these happy, smiling men of the Painted Desert have an eye for color! Among them sat Big Hat Charley, an old army scout, detailed by the Indian agent to guide us to our destination. Proud of the confidence the pale-face men reposed in him, this faithful and most business-like Navaho, cheerful and jocose withal, piloted us adroitly with our heavy wagon through the labyrinthine hills and bad lands, and by noon of the second day brought us to that remote corner of the desert where the Little Colorado Canyon meets the Grand Canyon itself. Here we were but a scant two miles from where we had stood four months ago. It seemed but a stone's throw across that narrow chasm, yet it had taken a full week's travelling, a detour of a hundred and fifty miles, to reach the place.

We worked furiously. The sky darkened. Any day might bring rain or snow, and wet weather was sure to convert that powdery desert into a sea of sticky paste that would stall an empty wagon. Also, our water was getting low. But luck was with us again, and before long we were "hitting the back trail." Thanksgiving Day found us at "Tuba," eating a white man's dinner with the superintendent of Indian schools. And when, at last, we set sail for the Bright Angel Hotel, there was many a Navaho blanket and Moki plaque added to the load. On the way back, tramping alongside the wagon, we indulged in the collecting of petrified wood; for out of that bare, sandy desert stuck the glistening trunks of countless fossil trees. After an absence of three weeks we bobbed up, serene and hearty, at our base of operations, having walked fully two hundred out of the three hundred miles.

There still remained the task of mapping the bottom of the Grand Canyon, more especially the course of the river in the sinister Granite Gorge. This was to be the final manœuvre, and in some respects the most remarkable of all. The snappy winter weather

and the anticipation of a successful "wind-up" combined to give the work a dash and vim that often bordered on recklessness. The party was distributed fairly all over the chasm, and its members had a way of emerging from it singly and at unexpected places, quite astonishing to their friends on the rim. Only seasoned men could have undertaken such bold movements. Six months ago we ourselves would have called them rash.

At one time two of the men were toying with the mighty river, descending its foaming rapids in a flimsy boat, while twenty miles away two others were creeping precariously along treacherous shaley ledges, intent on capturing a strategically located butte, with their instruments and maps on their backs.

The tourist trails, travelled by many in awe and trembling under the surveillance of a strapping guide, were to us like highways, safe at any time of day or night. Indeed, there was many a moon-light trip, and occasionally one in utter darkness. Sometimes the whole party would vanish for a week on a mysterious errand to some little-frequented nook, impressing stray burros into their pack train, and taking temporary possession of prospectors' tents, even of John Hance's\* winter quarters at the river. But you are expected to do those things in the West; and old Hance, happening in one evening and finding us comfortably established in his camp, cheerily proposed to bake the bread and acquaint us with his "caches" about the place.

It was the middle of January (the ground was white with snow) when the party reappeared for the last time at the Bright Angel Hotel. The outfit looked ragged and dirty, the tents well-nigh black with the soot of many camp-fires. The mess-kit, having participated in several wrecks, was now an ignominious mixture of battered remnants of variously modelled sets. The mess-chests, designed for use as a dining-table, had long since been abandoned at the site of some disaster. In fact, we had been eating from a sheet of canvas spread on the floor for the last six weeks. What a contrast with the nobby camp of the earlier months, with its air-

\*John Hance is the oldest settler at the Grand Canyon, and to the tourist public a picturesque and unique character, far famed for his incredible yarns.

tight stoves, acetylene lamps, and dainty napkins! But on a rough-and-ready jaunt through the bottom depths of the Grand Canyon these luxuries would have been a precious nuisance, nor did we miss them in the least. No sooner had we re-entered the borders of civilization, however, than the grotesque misery of it all became appalling. We hastily bundled things up, and shipped them away.

And when at last, lazily reclining on the soft cushions of a Pullman car, we were speeding back to Washington, the whole two years' wanderings seemed but a dream.

FRANÇOIS E. MATTHES.



CENTENNIAL COMMEMORATION OF WILLIAM  
BARTON ROGERS

1804-1904

On December 7, 1904, there were held in Huntington Hall, Rogers Building, commemorative exercises in honor of the one hundredth anniversary of the birth of the Founder. Because of the limited size of the hall, the audience was limited to the Corporation, Faculty, Undergraduates, and a few invited guests. The most honored among these was Mrs. William Barton Rogers. Following are the addresses:—

## ADDRESS OF HENRY S. PRITCHETT

PRESIDENT OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

"Let us now praise famous men," wrote the author of Ecclesiasticus, himself one of the shrewdest observers of those things which affect deeply the actions of nations as well as of individuals. In all times during that slow process through which our race has come to its present development, men have recognized that the progress of the race is due in the main to the energy, the wisdom, the spiritual foresight, of the few who can lead. The inertia of the great bulk of humanity is great. The race moves slowly and painfully, and the progress which has been made is only because the great men of the race—its leaders—have pulled forward the car of human destiny. It is well to remember famous men. We are come together here to-day, putting aside the ordinary duties of the day and of the hour, to refresh our own intellectual and spiritual energy, to give ourselves afresh to the work of the Institute of Technology by the thought of the work and of the life of the greatest man who has had to do with it,—William Barton Rogers, its founder and first President.

He was born a hundred years ago to-day in the city of Philadelphia. His life ended gloriously on this platform on which we stand in May, 1882. His boyhood and student life and his early manhood were spent in Virginia; and I am sure you will pardon me, coming as I do of Virginia parentage,



if I refer to him as a son of the Old Dominion. Massachusetts and Virginia, the two old commonwealths of the colonial days, notwithstanding the divisions and the strife which have come with the last half-century, have always had much in common, something which is born of longer traditions, of old-fashioned ideas of what a gentleman's life and duty are, and of a family life whose ideals are rooted in the older faith of our Revolutionary history. Somehow I cannot help entertaining a small conceit that a man born in Virginia and educated in Massachusetts has had a more than usually fortunate introduction into this world; and I never see a Virginia boy entered at the Institute of Technology without scrutinizing him a little more closely than the ordinary boy, in the hope that I may discover the evidence of that spark of genius which may possibly bloom into another Rogers. For sooner or later, in good time, if we are right in our system of education, the Institute of Technology will grow a man who shall have the intellectual strength, the clear vision,—in a word, the genius,—of William Barton Rogers.

It is not part of my purpose to try to tell you the story of his life or of his scientific fame. I hope that you students will read the story as Mr. Munroe has told it in the last number of the *TECHNOLOGY REVIEW*. There are old friends and colleagues of Mr. Rogers who are to speak to you to-day, and who can give you a far better impression of his charming personality than I can. Yet I remember with great satisfaction that I saw him and grasped his hand once. It was at a meeting of the American Association for the Advancement of Science, held in Boston in 1880. President and Mrs. Rogers gave a reception to the members of the Association at the then new Hotel Vendome. I had that day read my first scientific paper before the Section of Astronomy and Mathematics, and I went as a young beginner in science to see a man long since grown famous. I was one of hundreds whom he greeted that evening, and one whose name he could not have distinguished; but I shall never forget the charm of his face and of his manner. I have often wished that some kindly spirit might have whispered to him some hint of the future, and that we might have had some talk together.

Perhaps no one has quite the same opportunity to judge the work of a great man—certainly no other one has just the same view-point—as he who takes up, however unworthily, his task, and who undertakes to carry forward, however unsuccessfully, the work which a great man has started. Let me, in the one word I have to say on this occasion, speak of my own appreciation and my own estimate of the educational conception which

Mr. Rogers bequeathed to this country. It is worth our while on this Anniversary Day to look again at the original conception which the founder of the Institute had, not only because such a remembrance gives a just view of his power and originality, but because it will also show that his plan was one so far-reaching, so original in conception, and so practical in its details that it has taken the world years to catch up with it. In addition, it will serve to remind us that the School of Industrial Science, great and strong as it has become, is only a part of the scheme of education which President Rogers planned.

And what was this scheme? It was nothing less than a complete educational plan reaching from the highest development of scientific research, including the applications of theory, and extending to the most practical details of the training of men for the work of an industrial and commercial state. The Institute of Technology embraces:—

- I. The Society of Arts.
- II. The Industrial Museum.
- III. The School of Industrial Science.

The first division represented the influence and inspiration of scientific research, the second the applications and the opportunities for education in industry and in commerce and in fine arts, and the third was designed to train men, not alone for the work of the high-grade engineer as the Institute of Technology does to-day, but to reach down into the work of the mechanic, the foreman, the textile worker, and the commercial agent. In a word, in the scheme of President Rogers is presented a plan of education which deals with society as a whole and connects itself with the organization of society as we find it to-day. It has its summit and inspiration in scientific research, but it radiated from this into all the applications of education and of science.

What I wish to emphasize to-day is not the originality or the completeness of the plan, but to express my own belief that the parts of President Rogers's plan which yet remain unfinished are just as important to an industrial commonwealth such as Massachusetts as that which has grown great and strong. President Rogers started his whole plan with the idea of a body of men at the top engaged in scientific research, and I believe that the experience of fifty years has only strengthened the evidence that scientific research must be the inspiration and the crown of any system of scientific education. He planned as the second part of the Institute of Technology a great museum; and I believe no man can look to Germany, where this idea has been carried out in such practical form, without admit-

ting that, if the industrial museum had been given form fifty years ago, its influence on the Commonwealth would have been no less marked than has been that of the School of Industrial Science. And, finally, when we come to the School of Applied Science, which we of to-day are apt to think of as the Institute of Technology, let us remember that in President Rogers's scheme the school for the training of the soldier in the industrial army had just as real a place as the school for the training of the captains of that army; and one has only to look again to Germany to see how fruitful this idea has been in the industrial education of that country. An educational system founded on modern science and adapted to give to each man, whatever his station in industry, in art, or in commerce, the highest economic efficiency, was what President Rogers planned to provide; and it is such a system which we see practically carried out in Germany to-day. And all that I have to add is that to-day Massachusetts can do no wiser than to go back and recall the plans which President Rogers formulated more than half a century ago. The ideas for education which he gave forth are as fruitful to-day if we follow them in the spirit rather than in the letter. Research is as great a factor to-day as it was a half century ago, but we may perhaps bring it into our educational system more successfully by some other means than by a Society of Arts. An industrial and commercial museum is more important to the future of Massachusetts to-day than it was in 1860, because our competitors are gaining the benefit of them to our relative disadvantage; but its relation to the educational system of the State might perhaps be different from that which President Rogers suggested. In that first modest catalogue which he issued, that which we now think of as the Institute was described as "The School of the Institute of Technology," and its purpose was to provide by night classes for the instruction of mechanics and artisans no less than for the instruction of architects and engineers. This last purpose is just as pressing to-day as it was then, but it is altogether possible that the school for artisans might have a very different place in our educational system than that to which President Rogers assigned it. But, looking back to-day on his work, we see that it was that of a master; that, however the changes of forty years may have altered the details, the underlying ideas are as fruitful now as they were when he gave them to us. As we gaze with reverence and affection upon what he wrought, and as we go forward to carry those ideas of his into the future, let us not forget that those parts of his conception which are not yet realized are as important as that which has grown into power and into fame. As we cherish his memory and his work, let us give our devotion, not alone to that which is

visible, but none the less to that which is forgot or deferred; for in these lie no less the evidences of his genius and far-sightedness.

### ADDRESS OF LYON G. TYLER

PRESIDENT OF WILLIAM AND MARY COLLEGE

To be here in this historic city of Boston on this the birthday of William B. Rogers, the founder of the Massachusetts Institute of Technology, one of the foremost institutions of its kind in the world, is to me a very great honor and a very great privilege. And yet I hope I may be pardoned for saying that I feel that, to some extent, I have a right to be here. I cannot admit that any institution, no matter how great, can monopolize the fame of this truly distinguished man; for famous men are the common heritage of the world, and all of us are the heirs and devisees of their priceless glory. In the case of William B. Rogers, I cannot fail to read in his record, not only his greatness as a man, but his long and varied connection with the small but ancient college of which I have the honor to be the president. Student of William and Mary College at Williamsburg, Va., under the tutelage of a distinguished father who held the position of one of its honored professors, and then afterwards succeeding that father in his distinguished office, and having three eminent brothers who were also students there, William B. Rogers is a household name in Virginia, and a bright and shining star in the constellation of the famous alumni of William and Mary.

I confess to a feeling of pride when I mention these things, and I feel all the pride that a man ought to feel in his native State and in a college with which he is so intimately connected; but I am yet more proud in knowing that the name of one who is so near to us is equally dear to the people of Massachusetts, the foremost State of the American Union in trade and commerce, in the arts and sciences, and in the talents and genius of her scholars and statesmen. If we of Virginia nurtured and cared for him, and afterwards gave him all the field for action that a State purely agricultural could offer him,—made him State geologist, and successively professor of natural philosophy at William and Mary College and the University of Virginia,—you of Massachusetts, with better opportunities for the development of science, cordially received him, and placed him in a sphere where his talents could find a better chance for expansion. It is, of course,

unnecessary to say here that, of the many noble works accomplished by Dr. Rogers, the supreme effort and achievement of his life was the founding and establishment of this noble institution. Then, Mr. President, when at last having attained the green and rounded summit of a forceful old age, and an unrivalled pre-eminence in the scientific world, he passed away, in the very act of the performance of public duty, to the green valleys beyond this life, it was your historic soil that received his ashes; and now they repose in beautiful Mount Auburn, amidst the heroes and sages and patriots of Massachusetts.

Thus common sharers in his fame and glory, we can meet here to-day and feel anew that sincere and fraternal affection which associations like these inspired in the hearts of our forefathers in the days when the country was young,—in the days when Boston Port was shut up by an act of Parliament, and Virginia sent food and clothing to relieve the needy and starving inhabitants; in the days of Revolution, when this city was occupied by British troops, and the militia of New England heard the tramp of Morgan and his fearless riflemen coming to their aid from the hillsides of Virginia, my native State, and soon after greeted with resounding cheers the peerless Washington, as he rode into camp to assume command against the common enemy.

Once Daniel Webster said in conscious pride, "There Massachusetts stands." And I say with all my heart, "Here Virginia stands"; and let the two States clasp hands about the grave of Rogers "in union one and inseparable, now and forever."

Now, Mr. President, I wish to say a few words as to the old college of William and Mary and Dr. Rogers's career there. Boston people are always willing to learn something, even if it is in regard to something outside of Boston.

This College of William and Mary was founded in 1693, and during the colonial period enjoyed a fair degree of prosperity. Most of the distinguished men of Virginia down to 1861 were educated there. It is situated in Williamsburg, a town of two thousand inhabitants, and is distant about seven miles from old Jamestown, which it succeeded in 1699 as the capital of Virginia. Many events have united to make the town historic. It was there that Patrick Henry made his famous speech on the Stamp Act, there Dabney Carr offered his motion for the appointment of committees of correspondence throughout the colonies, and there the convention of Virginia made the famous demand upon Congress to declare the States free and independent. In 1779 the capital was removed to Richmond, where

it has continued to this day; and, owing to this removal, the attendance at the college was greatly reduced. It was still very small when Dr. P. K. Rogers, father of Dr. William B. Rogers, came in the year 1819 from Philadelphia, to take the chair of Chemistry and Natural Philosophy, to which he had been elected as the successor to the distinguished scientist, Dr. Robert Hare.

Dr. P. K. Rogers was a very distinguished-looking man, and lived in a building on the college green known as the Brafferton House, once used as an Indian school, but which is now used as a students' dormitory. His son William entered William and Mary at the age of fifteen, and soon attracted the attention of the Faculty by his diligence in the study of the sciences. After two years he went to Baltimore to study medicine, but in May, 1822, delivered an oration at Jamestown on the anniversary of the landing of the settlers. This address was remarkably mature for a youth of seventeen and a half years, and afforded a guarantee of the eloquent career in the lecture-room which gave Dr. Rogers so much credit and reputation in after-years. After five or six years spent in teaching and lecturing in Baltimore, he succeeded his father, in 1828, as Professor of Chemistry and Natural Philosophy in William and Mary College. Dr. Rogers was professor at William and Mary for seven years, and during that time established his reputation as the first scientist in the State. He was made State geologist, and in 1835 was transferred to the University of Virginia, where he remained for eighteen years, the pride of the class-room and the ornament of that institution. He then came to Boston.

On inquiring into the causes of the success of this great man, I trust that I may not be accused of provincialism in claiming that the early training which he received at William and Mary was an important element in his career. On reverting to the early history of the college, others besides myself, notably Dr. Rogers and the late Herbert B. Adams, a native of your State, have recognized the establishment there, long before the Revolution, of a higher and more thorough system of intellectual training than existed perhaps anywhere else in the American colonies. There were three distinctive features of the management at William and Mary which, as they have influenced the course of instruction and discipline in many institutions, both North and South, must have exerted an impression upon all its alumni, Dr. Rogers included.

The first, known as the *Lecture System*, was, as Dr. Rogers explains, the practice of combining, to an unusual extent, oral instruction in the form of lectures with the use of text-books. This system, taking the place

of the exclusive use of text-books, was introduced at the college as early as 1758 by Dr. William Small, of Birmingham in England, predecessor of Dr. Rogers in the chair of Natural Philosophy, and a man who needs no other proof of his ability than the fact that he was the friend of Watt and Darwin, and received from one of his students, Thomas Jefferson, the eulogy that he "fixed the destinies of his life."

The second feature, known as the *Elective System*, was the privilege allowed students of selecting such studies as bore more intimately upon their professional courses, by virtue of which the student preparing for law, medicine, or engineering, was not required to sacrifice any of his time in the acquirement of branches but slightly related to the object in view.

The third feature, known as the *Honor System*, was conspicuous in the liberal and magnanimous character of the discipline affecting the student body. It was the aim of the professors to control the students without harassing them with petty regulations or subjecting them to a system of espionage, in the class-room or on the examinations. As one of these professors wrote nearly three-quarters of a century ago: "The student comes to us as a gentleman. As such we receive and treat him, and resolutely refuse to know him in any other character."

Whatever the explanation, certain it is that all the advantage claimed for this training was reflected in the character of the worthy first President of the Massachusetts Institute of Technology. In him the free and independent spirit of inquiry was indissolubly united with a high sense of honor and a scorn of all low and disingenuous artifices.

It is a trite observation that, in the comparatively short period of three hundred years since Lord Bacon drew the attention of mankind to the study of Natural Philosophy, the world has made more progress than in all the ages before. This progress was at first very slow; and American colleges, like those of the Old World, originated with ecclesiastical bodies who did not look with favor upon the spirit of free inquiry which such study engendered. But about the middle of the eighteenth century the dogmatism of the age gave way, and the natural sciences struck deep root in the American soil. Favoring causes before the American Revolution made Pennsylvania and Virginia temporarily the leading colonies in the new dispensation. In Pennsylvania the spirit of religious toleration had been conspicuous from the beginning, and in Virginia the State Church had fallen into such utter disrepute that free inquiry was general. Then in both colonies appeared several remarkable leaders of thought; and, while the American Philosophical Society at Philadelphia and the University of

Pennsylvania attested the influence of Benjamin Franklin, the totally changed curriculum of the College of William and Mary in 1779 evidenced the influence of Dr. Small and his pupil, Thomas Jefferson. Through the reorganization act of 1779 the classical department and the two divinity schools at William and Mary were abolished; and the first regular chairs in the United States of Modern Languages and Municipal Law were instituted, the one under Charles Bellini, and the other under the celebrated George Wythe, the law teacher of both John Marshall and Thomas Jefferson.

By this remarkable change the college confronted the entire educational opinions of the times, and made permanent those features in the conduct of the institution which I have mentioned as the Lecture, the Elective, and Honor Systems, under the influence of which Dr. Rogers was trained, and which afterwards at the University of Virginia, founded by Mr. Jefferson, received an even more emphatic and extensive application.

Such were the early experiences of Dr. Rogers, and yet I do not wish to make too much of them. All the training in the world cannot make character; and that, after all, was the main element in the success of Dr. Rogers, as it is in that of everybody. Dr. Rogers as a student, a professor, and as President of this institution, tried to make his work the best of its kind; and, to do it, he built up a character. He knew the intimate connection of mind and body; and, to keep his mind clear and vigorous, he avoided all idleness and dissipation of the body. Above all, young men, like Sir Galahad in the poem, he kept his morals pure. In the language of Whittier, the Quaker poet of Massachusetts, his was

"A life of brave unselfishness,  
Wisdom for council, eloquence  
For freedom's need, for truth's defence.  
The championship of all that's good."

### ADDRESS OF FRANCIS H. SMITH

PROFESSOR OF NATURAL PHILOSOPHY, UNIVERSITY OF VIRGINIA

I have no formal commission, Mr. President, to represent the old pupils of Professor Rogers who are scattered through the South. They are gray-haired men: their number is rapidly thinning out. But there is one name at the mention of which their faces brighten as they recall the happy days,



half a century ago, when they sat at the feet of the great teacher, and heard those unrivalled lectures, sentences from which they can yet repeat to admiring listeners. If they believe that he has left behind him no equal, who that knew him can blame them?

It may be questioned whether a man's pupils or immediate associates are the best judges of his merits. It may be with great men as it is with great mountains. It takes both the near and the far view to know them well. The distant survey reveals the great outlines and the relative height. The near view discloses the massive grandeur and the individual traits which are lost to the far-off spectator. The tourist on the Rigi admires the Alps. The Swiss mountaineer loves the Alps. Some of us had both views of Professor Rogers. With the rest of the world we marked his public acts and his appearance in the great arena with the scientific leaders of his time. We also knew him in the class-room and in his home as pupil and friend.

I well remember the first time I ever saw him. He had just returned from his wedding trip in Europe, bringing with him to Virginia one of the fairest daughters of Massachusetts, who for four happy years graced our academic society with her charming presence.

In the unconventional and unceremonious style of college boys, we gathered at his door to welcome him home. Then for the first time I listened to that easy, delightful eloquence which, whether addressed to boys or men, always rose above the occasion.

More than fifty years have rolled away, yet Professor Rogers is still a living force with us. His name is carved on one of our buildings. His portrait looks down on our students in our chief hall. His bust is in our Physical Laboratory. Apparatus which was used by him and experiments devised by him are exhibited year by year, and never without respectful mention of his name. That name is a household word in the School of Geology. His fame is one of our college heirlooms.

I have called him a great man. May I tell you why we thought him so then, and why our estimate of him, formed in youth, was enlarged and confirmed in after-years?

Mr. Rogers (so we called our professor in Virginia: we still speak of *Mr. Jefferson* and *Mr. Madison*) was a great man because he was a great teacher. Ordinary teachers are common enough. Great teachers are few, and in every age constitute the real aristocracy of our race. To be such a teacher gives play to every power of the human mind and heart. Well-digested knowledge and the power to impart it are the lowest of its demands. Imag-

ination, sensibility, and self-control are inevitably needed, while reigning over all must be that love of truth which disdains to tickle the ear with a falsehood, and that love of man which prefers his future respect to his present applause.

Mr. Rogers never came to his classes to perform a perfunctory duty. He respected his young auditors. He told me once that he never rose to address them without a certain trepidation,—no fear of them, but respect for them and the truth he had to speak. He was of Juvenal's faith: "*Maxima debetur puero reverentia.*" Only great characters feel this: it is absurd to little men.

In power to make difficult things plain, he was unequalled by any other teacher I have ever known. His capacity for luminous exposition was really extraordinary. I have heard such excellent instructors as Courtenay and Bache speak with admiration of particular instances of his rare excellence as an expositor. At his touch complex subjects became simple and dark things bright. It was a memorable epoch in my own intellectual life when I first listened to his presentation of Newton's argument for universal gravitation. Joined to this rare gift of lucid expression was one which I have always ventured to place second among the elements of his greatness, although it was generally mentioned by his youthful admirers first. I refer to his high rank as a speaker. His eloquence was not labored or memoriter or ever turgid; but simple, easy, correct, and inspiring, growing naturally out of his subject. His imagination was always subject to his reason, and was never allowed to take the rein. A simple happy epithet would often illuminate a whole paragraph. When occasionally he would give play to a chastened fancy and afford his young auditors a relief from mental tension by a rhetorical sentence, as I have heard him say he sometimes did of set purpose, then would roll out on our delighted ears a strain of elevated, fascinating utterance, so felicitous that it is remembered to this day. Not only boys, but men were everywhere captivated by his remarkable platform power. At a British Association banquet, after a long line of speakers, he rose last of all before a weary audience. After a few sentences all were alert and alive: the tired company grew fresh again, and he sat down the winner of the honors of the evening. I have sometimes fancied that he owed this gift to the land of his ancestors, the beautiful island which has produced so many orators; which gave to Parliament a Burke and to Physics a Tyn-dall.

To these qualities of a great teacher Professor Rogers added the passion and capacity for original investigation. The great teacher cannot be a

mere mouthpiece for other men. He must know books, but he must know more. As the interpreter of Nature, he must hear her voice for himself.

Education is a "leading forth." The leader must go before, and go farther than his pupil. Mr. Rogers had a singular power of penetrating to the truth of things through the disguises with which Nature hides her jewels from the careless or superficial. This was remarkably shown in the work he did in his favorite science of geology. Here he was a pioneer. In those early days, geologists were largely confined to surface indications. Railway cuttings, tunnels, artesian borings, were almost unknown; yet such was his insight that subsequent explorers have often confirmed the conclusions reached by him from data meaningless to other men, and Virginian geology has grown on the lines laid down by him.

He possessed another quality which is generally thought to be rare among scholars. The public does not look to them for managers or administrators. The power to make wise plans and to bring things to pass, is an admirable one, by whomsoever displayed. This power he had and exhibited in two events of his life. He began the geological survey of Virginia in 1836. He organized his corps of assistants, directed their work, co-ordinated the results, instructed the public, drew from the legislature the annual appropriation,—all this, while he was carrying on the work of his chair at the State University.

His ability to plan and administer was still more strikingly shown when he left Virginia and came to New England. Amid more favorable surroundings here he was to realize the dream of his later years in the foundation of the great Institute of Technology. Its history is a romance. Years of struggle marked its origin. The public had to be instructed, friends gained, opponents met, existing interests conciliated or withstood, money collected, buildings erected and equipped, and a Faculty assembled. This was done largely by one man, approaching fifty years of age, and a comparative stranger. Behold the result in a polytechnic institution without a rival in the land! If in infancy it was overlooked, in its maturity its charms are drawing distinguished suitors. It stands as the crowning work in the life of its great first President. Our dear old master needs no marble shaft to perpetuate his memory. "If you seek his monument, look around you."

It may be doubted whether in this century, men like him are possible. When he grew up, a man might be eminent in several sciences. At an early British Association meeting some spoke of hearing Rogers, the geologist, others of Rogers, the chemist, and still others of Rogers, the physicist, not

dreaming that they were speaking of the same person. It was the boast of some of the professors of that day that they could fill any chair in the college. That day is gone. A man can be expert only in one small section of one subject. We are growing to be a generation of specialists. Our view is microscopic. We see more, but we also see less. Details are multiplied, but the field of view is reduced. In getting power to explore the atom, we may lose the power to see the world. If such men as Professor Rogers are no longer possible, we shall miss a great deal in losing the ample sweep which took in a great circle of knowledge, developing large and liberal sympathies, revealing helpful analogies and protecting cautions supplied by cognate branches of knowledge. Natural philosophy was physical science and something more.

In the twenty-one years since Mr. Rogers left us a great change has been coming over the educational institutions in our land. They are drawing closer together and getting to be like one another. Once they were isolated: now they meet in educational associations. Their frequent celebrations are attended by invited guests from all sister institutions. Academic honors are granted by one to the distinguished teacher in another. This national union of colleges has no written constitution, but it is getting to be felt as a reality. The students have not escaped this nationalizing tendency. There is arising in our land the type we may call the American student. Sectional differences, once so prominent, are growing less; while the great qualities of manliness and thoroughness are becoming the distinguishing traits of college men from every quarter. Students are less and less rated by wealth or family. Merit is coming to the front as the only just ground of distinction. Soon the college colors and the college yell will be the main difference between institutions. Every lover of his country will rejoice at this, and will hail the day when the youth of our great country, from whatever section they come, shall honor and strive for that which is true and honest and estimable. No one would have rejoiced more at this elevation of the student body than Mr. Rogers, and no one of his time contributed more than he to make it possible.

To this unity the passing of great teachers from one part to another of our land has powerfully contributed. When Professor Rogers came from Virginia to Massachusetts, the best we had was given to you. Your great Institute was not originated here. It was conceived in Virginia, but it owed its realization to the public spirit and enlightened liberality of Massachusetts. The Institute of Technology and the University of Virginia ought not to be strangers to one another. We have one precious memory in

common. In presence of that memory I salute you to-day, and bring the best wishes of the University of Virginia for the continued prosperity of the Massachusetts Institute of Technology.

ADDRESS OF ROBERT H. RICHARDS, '68

PROFESSOR OF MINING ENGINEERING AND METALLURGY, MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

No student of the present day can feel the thrill of discovery in quite the same way as the first seven of us who were the nucleus of the embryo school.

We were Professor Rogers's children, on whom he tried his experiments in education,—naughty children sometimes, teasing our professors like other students, but, I can truly say, without malice. That was not possible with that gracious presence, dignified, polished, courteous, albeit with a twinkling eye, ever before us.

*The beginning*,—for me it was the beginning of a new life, and in a greater or less measure it was the same for all the students of that first year.

As a boy at school in England, I had suffered under the Oxford idea of Latin, Greek, and mathematics of a cut-and-dried order. He who could and would learn by heart to please his teacher was praised. He who wished to know what it was all about, and balked if he failed to receive an answer, was blamed.

I belonged to the latter class,—one of the good-for-nothings. In the estimation of the masters at that day in England, any leaning towards scientific studies implied a lower order of intelligence.

Coming to this country at eighteen, I entered an academy in a neighboring State to prepare for college. The same old curriculum confronted me. The impassable wall again rose before me through which I could not go. The consensus of opinion began to affect me. I was on the point of believing myself the stupid dolt some of my teachers held me to be, when a letter from my mother brought the news of a scientific school just being started by our friend and connection, Professor Rogers. She asked if I would like to try it. I came by the next train; for, although I had no idea what such a school could be like, anything would be better than the purgatory of a condition where I could not find out how the teaching would benefit me or why I was thus taught.

At the age of nearly twenty-one, early in February, 1865, I entered the

new school, then a month old, seventh on the list, Eli Forbes having been the first pupil. When we numbered fifteen, on February 20, we were graded into the semblance of classes. We found ourselves attending Rogers's lectures in physics, illustrated on the blackboard by drawings and on the table by experiments. We spent hours in the chemical laboratory with Storer, where we actually did things with our one retort, and learned to observe, record, collate, and to draw conclusions from our experiments. In the drawing-room with Watson we learned that wonderfully simple and universal method of thought expression—drawing—by which a Russian may communicate his ideas to an Italian, although neither knows the language of the other. With Runkle we found that mathematics had relations with every-day life. That we might avail ourselves of the literature of science, we learned modern languages with Bôcher.

In all the day's work there was no reproof for the inquiring mind. It was all one continuous question, What is truth?

This is what the Institute of Technology stood for, and what it did for us that first spring term in the old Mercantile Library on Summer Street (opposite Hovey's). And what it did for those first students it has been doing for the hundreds each year since that time, although the exhilaration of those early days can never again be felt by any of us nor by any other class so keenly. It was the golden age of science. Whichever way one turned, wonders grew.

It is incredible that only forty or fifty years ago men were just beginning to believe that fossils were the record of past life preserved in rock books. Geology was a new and most fascinating subject, as presented in Rogers's lectures, although hardly recognized as a subject of collegiate rank. Mining and metallurgy were *arts*, showing but dimly the scientific form they were to assume later.

To you who have all your lives breathed the air of scientific discovery, unconsciously perhaps, the conditions of that time cannot be adequately described,—the cutting of hampering bonds, the opening of windows to permit of wide vision over the ripening harvest of knowledge. We found that there were worlds to conquer over our heads and under our feet. So absorbing did we find the New Education that we gave little heed to the fact that so radical a departure could not go unchallenged, and that academic recognition would come very slowly.

The requirements of modern industry, then growing more and more insistent, could only be met by a substitution of training in subjects vitally interesting to the age for those of more remote times.

The evident application of the newly acquired knowledge lent a zest to the labor which enabled the student to give an increased number of hours per week to his work without undue fatigue.

It was due to the craving of the community for a school better adapted to modern conditions that an opportunity was afforded to form an ideal suited to a scientific age. Rogers took advantage of the opportunity, and crystallized into permanent form the vague but growing aspirations felt by all thoughtful communities.

The Faculty, although without previous experience, developed strength through the elements of strength in the plan, and found themselves free to mould the school on the new lines, unhindered by tradition, unhampered by connection with an arts Faculty whose thoughts and ideals would not have been consistent with the true needs of the new venture. The University of Virginia, the École des Arts of Paris, the Polytechnikums of Germany and Switzerland, were drawn upon for ideas; but a fresh spirit was infused into all plans.

Winning the students and planning their work was not half the battle. Rogers had to persuade the community that the school they needed was the school his Faculty had planned. The instruction of the masses was always dear to his heart, and the lecture was his favorite means of enlightenment. He presented so forcibly to the community the claims of a technical school, and the value it would prove to the public, that funds to establish and maintain it came in.

His Society of Arts meetings became centres of interest for the leaders of scientific thought in Boston, and gave him the influence he sought. Not infrequently would an inventor make a lame attempt to describe his invention, leaving the audience not quite sure what it was. Rogers, who had never before seen the machine, would, in the clearest language and fewest words, describe its construction, operation, and use. But he did it in such a tactful manner that the inventor went away supposing the words were his own.

I believe we owe our name Technology to Dr. Jacob Bigelow, whose paper defining it should be in the hands of every student.

The end of that first term found us twenty-eight in number. Of these, thirteen stayed on into the fourth year, eleven were given degrees with three others who entered later, making the first graduating class of fourteen in 1868.

When the fall term of 1865 opened, the Faculty had doubled, with the addition of Atkinson, Eliot, Henck, Osborne, and Ware, with an additional space in a dwelling-house in Chauncy Street.

In January, 1866, we came to this building, the Rogers Building, standing in lonely grandeur, a more fitting habitation than we then recognized for the New Education.

Think of the boldness of this step! Such a fine, large structure for a school one year old and with only seventy-two students!

Of the surroundings I may say that there were no buildings west of Berkeley Street, except the Central Congregational Church. The tide rose and fell in an inlet where Trinity Church now stands. Horse-cars came up Boylston Street at infrequent intervals as far as Clarendon Street. The neighboring open squares were used for our games of football and the newly-made lands for our practice ground in surveying.

It is said that in 1865 there was not a single professor of mechanical engineering in any school in the United States; but, although the early instruction would seem laughably meagre compared with the Institute's equipment to-day, one student in the first class, A. F. Hall, took his degree in that course, six in civil engineering, six in geology and mining, and one in science and literature.

No school is all study and books. Personal character and conduct form the greater part of success in life. It will not be amiss to recall some of Rogers's methods of dealing with us by way of discipline.

Eli Forbes was ordered to report to the President. Rogers regretted that he was absent from the lecture, and asked after the health of his father. Miles Standish, newly arrived in the school, occupied the seat to which another student thought he had a prior right. Words and a slight disturbance followed. Quick as a flash, Rogers started his gyroscope, that curious toy which does everything you do not expect and nothing you do. It is needless to say both students forgo their grievances.

When Rogers took us to visit the coal mine at Portsmouth, R.I., some of our class began playing cards on the train,—at that day a reprehensible practice. Rogers came to the seat in front, and, leaning over, gave the group an interesting talk on geology. The game was forgotten.

One day the air became very close in the Summer Street lecture-room. The boys, forgetful of their manners, yawned continually. Rogers interrupted his lecture with the story of the German professor with whom yawning was contagious and serious, because it dislocated his jaw. Discovering this, his class used to take wicked advantage of their knowledge. "But," said Rogers, "young gentlemen, *I* do not suffer from that complaint."

One of my classmates describes Rogers as the most wonderful example he ever knew of knowledge, of kindness, of wisdom, and of eloquence.



So full of zeal he was that the students must work to the limit of ability to please him. Thus was set the pace we have kept. But with all this knowledge he was intensely practical; that is, he had the true scientific spirit which brings all truth to the service of all.

As a teacher, he was unrivalled for clearness of statement and elegance of expression. Added to the verbal charm was a wonderful skill in black-board illustration. Rapidity and accuracy were added to grace of line. His drawing of a perfect circle would always bring down the house in the Society of Arts. In a Lowell lecture, Rogers, wishing to illustrate that a stream of water was not really a continuous stream, passed a sheet of paper quickly through the jet, and, holding it up, the audience saw distinctly just three wet spots.

To have divined the need of a coming age, to have persuaded a whole community to accept and support the new conception, to have influenced and moulded students and teachers into a working model, so that consciously or unconsciously the superstructure is imitated by every successful scientific school in the English-speaking world,—this was the genius, this the title to fame, of the founder of the Massachusetts Institute of Technology.

Professor Rogers not only founded the Institute, but refused to allow its independence to be taken from it.

The wreath upon his memory is its continued independence.

## EXTRACTS FROM "MEMOIR OF WILLIAM BARTON ROGERS"

PRESENTED TO THE NATIONAL ACADEMY, APRIL, 1887, BY FRANCIS A. WALKER

*Read by Norman Lombard, '05*

William Barton Rogers was born Dec. 7, 1804.

His father, Patrick Kerr Rogers, a native of Newton Stewart, in the North of Ireland, had become, while yet a student at Trinity College, Dublin, suspected by the government, by reason of his patriotic affiliations, and, in view of the political persecution to which he was thus exposed, emigrated to America. Here he took up his residence in Philadelphia, receiving the degree of doctor of medicine on the completion of his studies in the University of Pennsylvania. Dr. Rogers began the practice of medicine in Philadelphia. Here he married Hannah Blythe, a lady of Scottish birth, and here were born his eldest son, James, and his second son, William

Barton, the subject of this memoir. Two other sons, Henry Darwin and Robert Empie, were afterwards born to Dr. and Mrs. Rogers. These four brothers were destined to form a family group scarcely to be excelled for native powers and acquirements, in the history of science, in this or any age or country. The death of his father called Patrick Kerr Rogers back to Ireland. Finding, upon his return to Philadelphia, that his long absence had impaired his professional practice, Dr. Rogers determined to remove to Baltimore, but soon afterwards accepted the professorship of chemistry and physics in William and Mary College, Williamsburg, Va. Here he resided during the remainder of his life, and here his four sons were educated. Upon his father's death, in 1828, William B. Rogers succeeded to his professorship.

William Rogers had already had experience in teaching science, having, during the preceding year, carried on a course of lectures in the Maryland Institute, Baltimore, where he first displayed, upon an adequate field, that power of clear exposition and felicitous illustration which he possessed in a degree perhaps never excelled.

As professor of physics and chemistry, we find him early publishing papers on the physical side of his department, one upon Dew and one, prepared in conjunction with his brother Henry, upon the Voltaic Battery; but his attention was at first bestowed, in greater measure, upon chemistry, and this, too, with reference to its industrial applications.

This special and strong interest in the economic bearings of science characterized the entire career of Professor Rogers early and late. He, of all men the least prosaic, gifted with a fervent imagination such as is rarely coupled with the disposition and capacity for patient and protracted research, valued science not more for the sake of the truth than for the sake of the virtue which is to be found in it for the amelioration of the human condition. Always had those investigations a doubled attraction for his mind which promised to place new resources at the disposal of mankind.

In the year 1835 Professor Rogers was called from William and Mary College to the University of Virginia, to fill the chair of natural philosophy and geology in that already eminent institution. During the same year he was appointed geologist of Virginia, a survey of the State having been provided for by the legislature, chiefly in consequence of papers printed and addresses delivered by him.

While vigorously prosecuting the work of the geological survey, during the several years succeeding, Professor Rogers carried on, without serious interruption, the duties of his professorship. The traditions concerning his

lectures, which still linger around the halls of the University of Virginia, tell of a force of statement, a felicity of illustration, a power of eloquence, marvellous to hear. Says one of his former pupils, William LeRoy Brown, president of the Agricultural and Mechanical College of Alabama:—

I remember well the very great interest in and enthusiasm for science which he excited among the students by his brilliant lectures. Often, especially when it was announced that he would begin his lectures on astronomy, have I seen his lecture hall crowded with students from other departments, including those of law and medicine; indeed, so crowded with young men, eager to hear the eloquent presentation of the subject by the professor whom they so greatly admired, that not even standing room could be found in the hall. All the aisles would be filled and even the windows crowded from the outside with eager listeners. In one instance I remember the crowd had assembled long before the hour named for the lecture, and so filled the hall that the professor could only gain admittance through a side entrance leading from the rear of the hall through the apparatus-room.

His manner of presenting the commonest subject in science—clothing his thoughts, as he always did, with a marvellous fluency and clearness of expression and beauty of diction unsurpassed—caused the warmest admiration, and often aroused the excitable nature of Southern youth to the exhibition of enthusiastic demonstrations of approbation. Throughout Virginia—and the entire South—his former students are scattered, who even now regard it as one of the highest privileges of their lives to have attended his lectures.

Traditions of the power of the orator, the legal advocate, the parliamentary leader, the philosophic reasoner, are rarely at fault; and, were we to depend on the testimony of his former students at the University of Virginia alone, we need not entertain a doubt that Professor Rogers was gifted, almost beyond the privilege of man, in the exposition of scientific truth. But he was yet to have a far wider audience, and everywhere, whether before the British or the American Association, or in still another institution of his own founding, or in learned societies not a few, or in the Academy of Sciences, over which he presided, he was to win continually new and higher triumphs.

To this contributed, not alone the *perfervidum ingenium* of his race, not alone an imagination which ever clothed truth with beauty, and made the dullest fact radiant with a significance illimitable and imperishable, but also every personal gift which can enhance the power of the orator. Tall in stature; with a figure of the type known to us through the pictures of Henry Clay; with a face that, destitute of all assumption or arrogance, was singularly commanding; with a voice whose compass and quality were capable of producing the largest and finest effects of speech,—William Barton Rogers was, in the height of his powers, without a peer among the scientific men of his age in addressing an intelligent and cultivated audience.

But, while Professor Rogers was thus delighting and entrancing the students of the University of Virginia with his lectures on astronomy and physics, he was in those early days of science carrying forward, in co-operation with his brother Henry, who simultaneously held the office of State geologist of Pennsylvania, one of the most important enterprises in the history of geology. To these two brothers, knit closely by intellectual as well as by moral sympathies, the world owes the unfolding of the great Appalachian chain.

Professor Rogers's active labors in connection with the geological survey of Virginia ceased in 1842. The successive annual reports which he rendered to the legislature of the State are models of clear statement and luminous exposition.

Throughout his labors in the field Professor Rogers continued his service in the University of Virginia, each successive class being to him a new band of pupils and friends, to whom he delighted to expound the truths of science.

In 1849 Professor Rogers married Miss Emma Savage, of Boston, daughter of the eminent genealogist, the Hon. James Savage, LL.D. The history of thought and research bears testimony on many a page to the aid which high-minded and devoted women have rendered to the cause of science, in soothing and solacing, in tending and comforting, in encouraging and sustaining the overwrought and much-perplexed students of natural laws; but that history contains no record of a nobler or happier companionship than that which began with the connection thus formed.

In the year of his marriage Professor Rogers visited England, and took part in the proceedings of the British Association for the Advancement of Science in Birmingham.

In 1853 Professor Rogers resigned his professorship in the University of Virginia and took up his residence in Boston, where he early associated himself with the American Academy of Arts and Sciences and the Boston Society of Natural History, taking an active part in the proceedings of both these learned societies, in the latter in close communication with Agassiz, Wyman, and Jackson.

His work during this period, however, was mainly in physics.

In 1859 Professor Rogers, gathering around him a number of the first citizens of Boston, began the public discussion of a scheme for technical education, to be associated, on the one side, with research and original investigation upon the largest scale, and, on the other, with agencies for the popular diffusion of useful knowledge. So entirely unfamiliar to the public mind of the day was the idea of technological instruction, beyond the sim-

plest requirements of civil engineering, that the legislature of Massachusetts could not be brought to see the full merits of Professor Rogers's most comprehensive and, as all now view it, thoroughly practical plan, but enough was done by the legislature during the few years following to secure the chartering in 1861, and the actual inauguration, in 1865, of the Massachusetts Institute of Technology, of which Professor Rogers became the first president, devoting to it all the energy and enthusiasm of his impulsive nature, and all the varied wealth of his accomplishments and acquirements. For the rest of his life this was his chosen work.

In the Institute of Technology the laboratory methods of instruction were first applied, in large classes, to the teaching of physics. Prior to this, physics had been taught in the lecture-room alone. The only laboratory was that in which the professor and his assistants conducted their researches or made preparations for illustrated lectures. At the most, and that very rarely, there was room and opportunity for a few advanced students to participate in the investigations of the teacher. In his new school Professor Rogers at the outset proposed the introduction of laboratory methods in physics as in chemistry. In pursuance of this scheme Professor Edward C. Pickering, then in charge of the department of physics, developed a system by which the largest classes could be trained to make physical observations and measurements, and gradually brought to the capability of conducting investigations with due regard to the conditions of a conclusive experiment.

So completely were his activities and sympathies enlisted by his new work that in 1868 Professor Rogers came under a disability which, for the ten years following, rendered intellectual exertions highly dangerous to life.

Mercifully recovered therefrom, under a personal care and attendance such as is seldom vouchsafed to invalids, in 1878 he resumed the presidency of the Institute, although under stringent limitations as to labor and excitement. On the death of the illustrious Henry he was elected, in 1879, president of the National Academy of Sciences, of which he had been one of the charter members; and, surely, few have been the men who would take a keener delight in presiding over the discussions of a learned society dealing with the whole range of exact knowledge, or who were more amply qualified and endowed for leading and inspiring the deliberations of such a body.

The wide extent of his own studies and researches in mechanics, physics, chemistry, and geology, his truly philosophical spirit, his unfailing courtesy and urbanity, his warm sympathies, his scientific enthusiasm, his command-

ing and stately presence, his rare gifts of expression, all combined to make him the ideal presiding officer. His introductions were most felicitous, his comments highly suggestive and inspiring, his summing-up was always a masterpiece of discriminating and judicious reasoning; while over all his rich tropical eloquence threw a spell as of poesy and romance, for to him the truth was always beautiful, and the most solid and substantial structure of scientific principle stood in his view against a sunset sky, radiant with a light which no painter's pencil ever had the art to fix on canvas.

In 1881 his increasing infirmities led him to resign to another the presidency of the Institute of Technology, in which, however, in testimony of his unabated interest and devotion he remained professor emeritus of physics and geology. When thus he was compelled to withdraw from his more active duties, thousands of well-wishers, alike in the fields of his earlier and of his later labors, hoped for a long twilight of quiet happiness and mellowed glory, amid all that could soothe and cheer and charm the decline of life; but the end of this career of honor and usefulness was at hand, and that end was to be sublimely fitting and appropriate to that career. On the 30th of May, 1882, he rose to deliver the diplomas to the graduating class, most of whose course had been passed under his presidency. His voice was at first weak and faltering, but, as was his wont, he gathered inspiration from his theme, and for the moment his voice rang out in its full volume and in those well-remembered, thrilling tones; then, of a sudden, there was silence in the midst of speech; that stately figure suddenly drooped; the fire died out of that eye, ever so quick to kindle at noble thoughts, and, before one of his attentive listeners had time to suspect the cause, he fell to the platform—instantly dead. All his life he had borne himself faithfully and heroically, and he died, as so good a knight would surely have wished, in harness, at his post, and in the very part and act of public duty.

## ANNUAL MEETING OF THE ALUMNI ASSOCIATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

The meeting was held at Hotel Brunswick, Friday, Dec. 23, 1904, at 5.30 o'clock, President Mixter in the chair. Reports were received from the Executive Committee, the committee on the School, the trustees of the Life Membership Fund and of the Alumni Fund, the trustee of the William Barton Rogers Scholarship Fund, the Advisory Committee on Athletics, the Walker Memorial Committee, the Runkle Memorial Committee, the Nominating Committee, together with the financial report of the secretary.

The following is a list of the officers nominated for the coming year, all of whom were elected: Frank L. Locke, '86, president; Walter B. Snow, '82, vice-president; Arthur G. Robbins, '86, secretary; Walter B. Trowbridge, '92, and Charles-Edward A. Winslow, '98, members of the Executive Committee; William T. Keough, '88, member of the Committee on the School; Frank L. Fuller, '71, trustee of the Alumni and Life Membership Funds; J. Arnold Rockwell, '96, member of the Advisory Committee on Athletics; Leonard C. Wason, '91, Ellis F. Lawrence, '01, and Walter E. Hardy, '04, members of the Committee on Associate Membership. The printed report for 1904 was approved. The Executive Committee were authorized to appoint a nominating committee of five to nominate officers for next year. The secretary was authorized to print and mail to members the reports of the various committees.

Adjourned.

ARTHUR G. ROBBINS, *Secretary.*

### EXTRACT FROM THE REPORT OF THE EXECUTIVE COMMITTEE

The following procedure, outlined in the recommendations of the Association of Class Secretaries given below, and adopted by the Executive Committee after consultation with the President of the Institute, is presented for the information of alumni:—

The Association of Class Secretaries respectfully recommends to the Executive Committee of the Alumni Association that, whenever the plan of combination of effort of the Institute with Harvard College is referred to the alumni, the Executive Committee seek to carry out the following method of procedure:—

1. That a general meeting of alumni be held for the systematic discussion of the plan presented.
2. That a report of this discussion, in print, be sent to the alumni generally.
3. That, with the report of the general meeting, there be presented to the alumni, if possible, the opinion of the Faculty on the educational issues involved.
4. That thereupon the definite opinion of the alumni upon the proposed plan of combination be obtained by letter ballot.

#### EXTRACTS FROM THE REPORT OF THE COMMITTEE ON THE SCHOOL

This report, if it has any worth, is valuable in showing the opinions of leading members of the Faculty upon the needs of the departments. The idea of your committee has been, not to give their own opinion, but to give you a concise, unprejudiced statement of conditions as they exist to-day, so that the report may help each one reading it to determine his position upon the questions that are agitating us all, especially the question of moving to a larger tract of land, where we would have room for more buildings and for growth. . . .

That there may be no misunderstanding, we now state that, in spite of the great needs of the Institute, all the departments are accomplishing splendid results.

One cannot go over the different departments, as the chairman of your committee has done, without being impressed by the energetic and intelligent work of the instructing staff; and it is the opinion of your committee that all departments are interested in improving and enriching the curriculum as fast as the Institute's resources permit.

#### *Information obtained from Members of the Faculty*

For several successive years Professor Lanza, of the Department of Mechanical Engineering and Applied Mechanics, has recommended buying certain apparatus for the use of its large and growing classes and to en-



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able it to maintain the leadership in its field. When the new apparatus is bought, more room will be needed by the department.

For those of us who think that the Institute is keeping its lead over other similar institutions, it is startling to be told that the yearly appropriation to cover the general expense of this department has not been increased since 1893, and that this year it is 11 per cent. less than it was then, although since then the number of students in its various branches of work has about doubled. Some apparatus has been bought, and the number of instructors increased.

Naturally, hurtful economies have been made, and it is believed that the yearly appropriation, instead of being reduced, should be increased.

Attention is called, also, to the consequences following from the low salaries paid, and the slowness with which advancements in salary and in grade are made, though recommended by the head of the department. . . .

The Department of Civil Engineering, under Professor Swain, is doing excellent work.

The room for the Civil Engineering Library is already inadequate; and in two years the books in the library will take up all the space, leaving no room for readers. Another large lecture-room and more instruments are needed. If the number of men taking this course increases, the draughting rooms must be enlarged. Money is needed for additional instructors, and also for paying higher salaries.

At the civil service examination held in January, 1904, for hydrographic aids in the Geological Survey, eight men passed. Of these eight the men who stood first, second, third, and fifth were graduates of Courses I. or XI. of the Institute.

At the examination held one year ago for the position of assistant civil engineer in the navy department of the United States government, nine men were allowed to take the examination. Of these nine, four passed; and of these four those who ranked first, second, and third were graduates of Course I. of the Institute.

The Department of Mining Engineering and Metallurgy, in charge of Professor Richards, is hard pressed for space, and cannot have more students without seriously curtailing the advantages which students now enjoy. . . . For best work and good equipment twice the room now occupied is needed. Ability to pay higher salaries to assistants would result in their staying on with the Institute instead of leaving after two years, and would strengthen the department materially.

Professor Clifford, who now has charge of the Electrical Engineering

Department, reports that during the last year a change of system has greatly increased the efficiency of laboratory instruction. This change has been chiefly due to obliging each student to make a preliminary report, setting forth the object of the work to be done, the procedure, apparatus, and instruments to be used.

Much additional equipment, money for more instructors and higher salaries, are wanted, especially to allow research work to be done, by relieving instructors of some routine work.

Professor Cross states that in the Department of Physics more room is needed for optical work and for the Laboratory of General Physics, and that it would be a great convenience to have another lecture-room; but, generally speaking, he thinks that the department can get along without serious detriment to its efficiency for the next five years with the space now at its disposal. Money for more men in the instructing staff, and for better salaries for the men employed, is the crying need of this department.

The Biological Department, under Professor Sedgwick, is thoroughly organized and well equipped for its work, its only needs being that Room 20, Engineering B, should be turned over to the department, and fitted up for carrying on experiments on a semi-commercial scale in industrial biology, and that more money be provided for the purpose of paying the instructors large enough salaries to relieve them from the necessity of earning money by doing hack work, and thus to enable them to devote all their time to the Institute and to work of a kind that will develop them along proper lines as scientific men. . . .

It is worthy of note that the head of the Chemical Department of Beloit College is spending a year taken by him for advanced work in working in the Biological Department of the Institute instead of going to Europe, as he originally intended to do, the reason being that he found that he could better get what he required from our school than from any European university.

The Institute is to be congratulated on having obtained the services of Professor T. A. Jaggar, who now has charge of the Department in Geology. Professor Jaggar desires more room, primarily for separate rooms for instructors, and more space for collections. A much larger room than the one now provided is required by Professor Crosby for the constantly growing collection of Economic Geological specimens. Professor Jaggar also feels the need of money for additional equipment, for higher salaries and for more assistants. . . .

Professor Talbot tells us that it is increasingly difficult to attract and

hold able men in face of the temptations offered by the salaries accompanying technical positions, and also that the need for more adequate accommodations for the work of the Department of Chemistry and Chemical Engineering is more keenly felt each year. Not only are certain branches of the instruction suffering from the congested state of the laboratories allotted to them, but the department, as a whole, is lessened in efficiency because of the isolation of portions of its work in separate buildings (four in all), three of them away from the Chemical Library and the sources of supplies, and so widely distributed that community of interest among the members of the department working in different lines is seriously diminished.

The best interests of the department are keenly suffering for the want of rooms for the instructing force. This has handicapped us in obtaining men of ability from other institutions, and still more in not allowing for investigation work by some of the instructors, especially those in the junior grades. . . .

The priceless value of our Chemical Library demands that it should be placed in fireproof quarters, and it will also soon need increased shelf room. It probably has no equal in this country,—as a departmental library,—and scarcely in the world; and it would require a lifetime to replace, if, indeed, that would be possible. . . .

Funds should be provided to develop the industrial side of the work, and to offer increased facilities for the investigation of problems brought to the Institute by manufacturers. . . .

Professor Chandler of the Architectural Department has sufficient room for his requirements, his only pressing need being more light in two of the draughting-rooms. More instructors are needed, and also more money for higher salaries. This department can only be compared with the Beaux-Arts in Paris, and is far ahead of any other architectural school in this country. Professor Chandler is to be congratulated on having such an able associate in Professor Despradelle, whose influence is an inspiration to all the men of the department..

Professor Peabody, of the Department of Naval Architecture, tells us that for good prosecution of his work more room and equipment is needed, and that higher salaries should be paid and more instructors engaged, especially instructors to assist Captain Hovgaard in warship design.

He has received many generous gifts from friends of the school, notably General Paine and Dr. Weld, but still needs certain very expensive instruments. While the instruction given is as good as that given in any school of naval architecture, it seems to your committee that this department

merits one or two separate buildings thoroughly equipped with instruments and apparatus, and with a suitable shop, draughting-room, model-room, storeroom, library, and water tank. . . .

Professor Burton advises us that twice as much room, better lighted and better equipped, is required for the Department of Drawing and Descriptive Geometry, and that money should be furnished for more assistants and for higher salaries.

The English Department, under Professor Bates, the Department of History, under Professor Currier, the Department of Economics, Statistics, and Political Science, under Professor Dewey, and the Department of Modern Languages, under Professor Vogel, only require class-rooms, and are not suffering for lack of space.

Professor Tyler, of the Department of Mathematics, tells us that, practically, all that he needs is money for paying higher salaries to teachers, in order to enable them to escape the drudgery of private tutoring, that sacrifices time and energy which should be devoted to their own scientific development. . . .

#### *Social Life and Athletics among the Undergraduates*

Steps being taken at the Institute to give the students more social life, and to put athletics and the annual contest between the Freshmen and the Sophomores on a reasonable footing, are worthy of comment. . . . Particularly to be commended is the custom of having a dinner a few days after the event, which is attended by all the men who have taken an active part in the Field Day sports. The social side of athletics is lost sight of among nearly all American colleges; and the Institute of Technology deserves particular credit in pointing out to them that athletic contests among college students are contests between gentlemen, and that the winning of events is unimportant compared with the good fellowship bred by friendly competition. . . .

The annual meeting was followed by the annual dinner, attended by about two hundred and fifty persons. Dr. Mixter, president of the Association, presided, and among the distinguished guests were Mrs. William B. Rogers, Mr. William Endicott, and Professor E. C. Pickering. The dinner was in commemoration of the one-hundredth anniversary of the birth of President Rogers, and the speakers were ex-President Crafts, President Pritchett,

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Professor Cross, Mr. Munroe, and Colonel Locke, the newly elected president of the Association.

*President Crafts said in part:* There are no important events in my remembrances of President Rogers, I am sorry to say. I cannot remember, of course, his work in Boston as president of the school, for I was not in the country at that time. My remembrance goes back farther to a period which has been little spoken of,—the time of his first coming to Boston in 1853. I was then a boy of fifteen, with sufficient taste for science to make myself disagreeable to every one in our house.

No chemistry was taught in the schools in those days, and Professor Hare's was the only book I could obtain on that subject. And when experiments failed, as they often did, I had the great happiness of being able to turn to Rogers for hints toward better ways. . . . I have the most grateful remembrance of the kindly attention which he gave to a boy's difficulties, the lucidity of his explanations, and the wonderful stimulus of everything he had to say.

In Professor Rogers's lectures the balance between experimentation and explanation was exceedingly good, and mention has been made of his great dexterity in experimenting. His drawing of a perfect circle on the board always brought down thunders of applause. . . . Rogers's method was to place his somewhat angular elbow on the board as the centre, and then, with a sweep of his long forearm for a radius, to complete as much as possible of the circle, after which he would change the position of his arm, and finish it.

Professor Rogers was a man of the best literary culture and the most highly educated taste; and it is not improbable that the good taste which made the Rogers Building the best of its time, and still one of the best in Boston, may be due in some part to his familiarity with the charming assemblage of buildings around the campus of the University of Virginia.

I am glad to add one more reminiscence to the trivial ones I have been able to give you. The Rogers Building has been mentioned; and quite recently, in connection with the Walker Building, the first treasurer of the Institute of Technology, appointed, as he says, because the Institute at that time had no assets and no liabilities, told me a story illustrating Professor Rogers's simple code of ethics. . . . The building was erected with a legacy from Dr. Walker, which was one of the first large sums of money that ever came to the Institute; and it appeared after his death that the will left an insufficient provision for the family. President Rogers called the

treasurer in one day, after this money had been received, and said: "I understand there is some injustice done, that the heirs, a mother and daughter, I think, are not sufficiently provided for. Do you think that is right?" The treasurer said, "No, I think that it is not as it should be." "Then," said President Rogers, "we will make it right." And this, although the heirs had made no attempt whatever to contest the will.

Do the ethics of the Golden Rule seem to you far removed from the usual habits of thought of a man of science? I think not. As Professor Rogers walked the hills of Virginia and Pennsylvania, hammer in hand, sounding the ribs of old earth, inspecting her crevices with practised eye, listening to her secrets with trained ear, he learned that first lesson of all science, the steadfastness of natural things, the constancy of nature, the unbroken sequence of her law.

This is the story that one day telleth another, one night certifieth another; there is neither speech nor language where their voice is not heard. It is an ordering of things so different from the vagaries of our own nature, so unlike any that the human mind has formed for its own government, or imagined to be the scheme of the Creator, when in the words of the great cynic "man remade his maker in his own image," that the knowledge of these laws leads to a belief in a higher power.

He, whom true science has brought into communion with nature is indeed leading the simple life, and when the occasion comes he takes the true decision simply, without forethought, and without afterthought, for his natural philosophy is a moral philosophy.

If some of these slight and trivial recollections have called before you any shadowy apparition of the gentle character and most attractive person of William Barton Rogers, we can say that we have been in good company to-night.

*President Pritchett said in part:* I come before you every year, at this time usually, to tell of the things we are going to try to do in the year to come.

We come, however, to-night to speak of a great name,—the name of the founder of the Institute itself. I wish that I might have had that sort of acquaintance with him which even a younger man might have with one already famous, already a leader in science and education. It was my fortune to meet him only twice; and, as I look back, that seems, in the span of my own lifetime, as if it were an epoch.

I had the pleasant duty three weeks ago, in our student gathering, to

try to give some brief estimate of President Rogers's great conception which he left with us. I am not here to repeat that to-night. Perhaps no one looks at a great man's work in just the same way or from just the same standpoint as he who tries to step in and do it, however unworthily or unsuccessfully. . . . I was trying to speak of that two or three years ago in a gathering here; and, after I had closed, I remember, Mr. Cummings, Dr. Hale's successor, got up. And he said to me: "You ought not to complain or be discouraged at what you are trying to do. I am trying to follow Edward Everett Hale." The next man who got up was our friend Dr. Donald, now gone, too. And he said: "Neither of you boys"—in his kindly way—"should say a word. I am trying to follow Phillips Brooks."

Professor Smith, who was here with us three weeks ago, and whom I wish you could all have heard, because he reflected in his own countenance and words much of the very spirit, much of the very genius, which he tried to describe, and which he did describe so well,—Professor Smith referred to President Rogers as having as his chief title that of "A Great Teacher." He was a great teacher; and Professor Smith is right in saying that that is, after all, the greatest title which we can give to a man. When the Buddhists come to think of all the high titles they can give to Buddha, they speak of him last as "The Teacher." And it is in the quality of a teacher that one comes to think of him when one reads what he has written and spoken.

But that of which I speak to-night is simply one phase of the educational work which Professor Rogers impressed on those who had to do with it, and that is the emphasis he placed throughout all his administration upon the place of the lecture in educational work. Always and everywhere he insisted that, however the text-book might aid, however essential, however absolutely necessary it was, after all, there came to the student body the greatest inspiration from the man who stood face to face with them, and talked with them. . . . Any system of education which fails to take into account the fact that the living teacher is, after all, the greatest spring of intellectual progress, intellectual enthusiasm, intellectual idealism, will, in the end, become fixed and formal. . . . And the great teacher is a man who talks face to face with his students about the things he teaches.

The other thing of which I wish to speak very briefly is this,—and President Crafts has already alluded to it. When the Institute was at its beginning, when it had barely enough money to put up a single building, President Rogers erected one of the best educational buildings in this country; and he put here, in a prominent place, a building which is to-day the only

architectural building which the Institute possesses,—a building which, for that very reason, for the reason that it has something of beauty, something of suggestiveness, something to touch the imagination, has become that about which our memories and our affections centre. That was a thing which only a far-seeing and courageous man would do. The ordinary man would have put up a cheap building. He would have put up something to get along with, not something to last for the future. And, in doing that, President Rogers showed some of the qualities of the far-seeing, the courageous, and the great man. Some day the problem of building may stand before us. If it does, I hope we may erect buildings beautiful, simple, and yet so real and so true, that they may stand for the life which goes on within them.

*Professor Cross said in part:* I have been asked to say something with regard to the educational work of President Rogers. . . . I think, if we look at the Institute itself, at its buildings and apparatus; if we consider its present Faculty; if we remember the members of the Faculty who are no longer with us; if we think of the great body of alumni and former students, those gathered here and the great army of them scattered throughout the whole world; if we think of all these men have done and are doing, if we think of the great things which in the future will come from their work,—there we have the educational work of President Rogers. I don't know of anything which shows it better.

I hold in my hand two pamphlets which I regard as two of the most important educational documents ever written in this country. One of them was written in 1861, and is entitled "Objects and Plan of the Institute." The other was written in 1864, and is entitled "Scope and Plan of the School of Industrial Science." In the first we find laid out the triple scheme of the organization of the Institute, and in the other we find laid out, not in detail, but sketched by a master hand, the principles which have taken form in that Institute.

Perhaps the most important project of them all, as connected with Professor Rogers in a purely educational line, is his introduction of the laboratory system. . . . But he did not fall into the error into which many persons have fallen since; that is, in imagining that laboratory teaching could supplant work in the lecture-room and class-room.

Professor Rogers also recognized another difficulty which I think those of us who deliver lectures recognize, but find ourselves unable to solve. In one of these pamphlets he speaks—at least in the case of younger stu-



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dents who have not conquered the difficulty of taking notes—of having professors go over their notes individually, correcting them and putting them in order,—a most admirable discipline for the student, certainly, perhaps for the professor as well, but one which, however well it might be adapted to the small number of students one would expect to have at that time, could not be carried out by any one individual with many students. Perhaps by and by we shall be able to come to that,—to go over those infantile notes and set them in proper shape. It would be of incalculable benefit to the students.

President Rogers also saw this,—a fact that is trite now, but it wasn't in 1864,—that the foundations of instruction in applied science lie in theory. He saw that any engineer or chemist or scientific man, to be properly trained, must have a thorough grounding in chemistry, physics, and mathematics, the three pillars on which the completed structure must rest.

One may ask the question, of course, whether this education has been fully a success or not. Undoubtedly, much more can be done in various ways than we have done. There is no doubt that in many of the subjects taught we haven't got all we might out of them. . . . Many of the things that students lack so much, they lack, not because they have not been given the necessary instruction, but because they have not taken the advantage they ought to have taken, and that they could have taken, of their opportunities.

I have heard that criticism has been made upon the Institute from some of our friends without that it is an institution which gives men an admirable training to fill small places. I suppose that is true, but I have yet to learn that an institution which properly trains men to fill small places does not at the same time train them to fill large places, also. It seems to me that the great merit of the Institute is this; that every man who graduates has at least done certain things, and has done certain things fairly well. He may be far from being a genius, but at any rate he has learned to do something; and I have yet to learn that our men have failed to stand the test which practical life has put upon them. And that, it seems to me, is the great test of an institution, as to whether the many which it turns out—not the few, but substantially all of them—are capable of doing the work which they have been trained to do.

There is only one word more I desire to say. I have spoken of certain points which have occurred to me in regard to the educational work and the ideas of Professor Rogers. It seems to me, however, that deeper than any

of these ideas are two principles—one of them has already been alluded to by another—which lay at the foundation of all his scientific work, as they lay at the foundation of his manhood. Those principles are truth and duty. The thorough, impartial, enthusiastic study of truth was a characteristic which no one who has listened to Professor Rogers's lectures, or who has had the slightest acquaintance with him, could fail to appreciate. . . . And, furthermore, his appreciation of the duty which lies upon every educated man to make the fullest use of his knowledge for the benefit of mankind was equally marked. These two things—truth and duty—are his legacies to the Institute and to us. If we accept those legacies and treasure them, the Institute will be in the future, more even than it has been in the past, a shining light in the city, in the nation, in the world.

*Mr. Munroe said in part:* I can see Rogers passing through the corridor of the building afterwards to bear his name, accompanied by some other professor or by the devoted, loving wife. I see him with a great cloak thrown over his shoulders, his soft white hair made whiter by the velvet of his upturned collar, his piercing eyes undimmed by age, his almost ethereal body vibrant with mental and spiritual energy, every feature and every gesture telling of firmness, of decision, of power to lead men, of determination to lead them right. How insignificant and immature we youngsters felt in such a presence as that! And yet how courtly was his salutation, how kind his voice, how fatherly, how almost motherly, the tone and manner in which he greeted us! For were we not his boys? and did we not hold, to his vision, the future of the Institute in our as yet untried hands?

And I see him again as we boys, brought at least to manliness by four years at the Institute,—at that Institute which was then too small, too poor, too experimental, to give us the hundredth part of what it gives to its graduates to-day,—I see him as we fellows stood up to read our graduating theses on that beautiful thirtieth day of May, 1882. Our feeble part of the exercises done, that great up-builder of the Institute, President Walker, began the commemoration of that memorial day by lifting the name of Rogers, in a few sentences of eulogy unsurpassed for eloquence, up to that niche of fame where it belonged and where it will evermore remain. And then at that moment of the culmination of his unique and noble work, at that moment of passing over to his successor the scroll of the Institute's achievement and the torch of the Institute's aspiration,

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on that spot which was the very centre of his labors and his visions, surrounded by those he loved and who loved him best in all the world, our eyes and our very hearts fixed upon him as the incarnation of the Institute of Technology,—then and there we saw him taken before our very eyes, as in a chariot of glory, to his everlasting reward.

Men of Technology, our outlook, our thought, our planning, should be all forward, and not back. Yet to gaze, as this month we have been, upon the work and life of William Barton Rogers is not to look backward toward a labor that is done. It is to look forward to where he stands, up there far beyond what the Institute has yet reached, far ahead of what the Institute has yet been able to achieve, pointing out to us the way in which the Institute should go. . . . We are making men over there at the Institute. We are making history over there. And we will make those men sound and true, we will make that history vital and effective, just so long as we keep our eyes lifted to Rogers up there as our model and our teacher. We must train our young men to be like him, absolutely pure in life, absolutely honest in thought and word and deed; ambitious to serve, not himself, but his fellow-men; high and broad and lofty, yet ever clear in his thinking; rich and exuberant, yet never guilty of exaggeration or equivocation in his speech; courageous in carrying forward what he believed to be sound and true; of a higher courage still in scorning the handicaps of personal illness and bodily enfeeblement. Those distressing illnesses of the body, those vexing cares of the mind, those million great and little harassments which surrounded the tremendous labor which he did in building up the Institute of Technology,—all those have been laid aside as a garment, and the great soul of our founder stands out untrammelled, a living, growing, fructifying force. We see it kindling the minds of this group of students, illuminating the path of that group, stimulating to higher achievement and ambition a thousand others. We find it permeating the whole atmosphere of the Institute of Technology. We perceive it striking with wonder those who seek the secret of the Institute's success. And we of the fortunate brotherhood, we who, consciously or unconsciously, have been touched by its Promethean fire, we know that spirit of William Barton Rogers to be the great heart that is carrying life and strength and vitality to every fibre of Technology.

*Mr. Locke said in part:* Mr. President,—Friends,—I want to call you more than friends. I want to feel that our coming together in these gatherings is due to something more than ordinary friendship. First of

all, I want to tell you that I appreciate fully the honor you have paid me to-night. I feel proud—and what man would not feel proud?—to stand as your accredited leader.

I want to ask you to think of what has been accomplished during the past year. It seems to me we have been brought closer together, and have been brought to realize our responsibility as alumni. Last June, at the dinner, our attention was called to a way in which we might be of assistance to the Institute of Technology. How well you have responded to that call has been already told you. Again, we have been told to-night of plans under consideration for giving the Alumni Association representation in the Corporation. And I want to feel that this is to give us much pleasure and much satisfaction, that it is to be a movement in the direction of strengthening the bond which binds Corporation, Faculty, and alumni in a common cause. From this will come to us, I believe, pleasure in the comradeship, help in our business lives, and satisfaction in feeling that we are doing something for the public good.

Our reunion last summer developed something of the good old-time Technology spirit that we used to have when we were students. I want to see that spirit grow. Let us not forget it. Let us nurse it. Let us think Technology, talk Technology, shout Technology. And let us begin right now. Let us have one more long cheer. I believe we haven't given a good, rousing cheer for President Rogers. Let us do it now. [Applause and three cheers for President Rogers.]

The following letter was received by Dr. Mixter too late to be read at the dinner:—

THE ROYAL SOCIETY, BURLINGTON HOUSE, LONDON, W., 12th Dec., 1904.

Your letter has come too late, I fear, for this reply to reach you before the meeting of the Alumni Association on the 23d inst. Nevertheless, on the chance of its still arriving in time, I send this brief note.

You ask me for "a few words about my knowledge of the worth of W. B. Rogers and of his standing in the scientific world." My personal acquaintance with him was but slight, yet it was enough to enable me to appreciate the singular beauty and charm of his character. He impressed me as one of the most devoted, unselfish, and sympathetic men I ever met. Never shall I forget a dinner given in my honor by the late Augustus Lowell at his delightful home near Boston, where I sat opposite to Rogers, and had ample opportunity to watch the wonderful play of expression in his venerable and

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striking face. I was seated between Longfellow and Oliver Wendell Holmes, but I found myself often with my eyes riveted on Rogers and thinking of the brilliant career as investigator and organizer and teacher which had finally placed him in the chair of the National Academy of Sciences,—the acknowledged and revered Nestor of American science.

It would be almost an act of impertinence on my part, were I to allow myself to praise his scientific achievements. They need no commendation from me or any one. I will only say that, appreciating them so highly as I do, I have often regretted that his strenuous devotion to the task of instruction left him with so little time for prosecuting original research, for which he was so pre-eminently qualified. His classic essay on the structure of mountain chains was in itself enough to secure him a place among the immortals of geology. How often, too, have I pored over his admirable memoir on the solvent action of water upon rocks and minerals! It was naturally to his geological writings that I turned, but I well knew that he was far more than a geologist. His eminence in chemistry and physics gave a special value and suggestiveness to his geological work.

Most heartily do I join with your Association in doing honor to his memory. While I recognize the strength of his scientific energies, I felt that even greater than these was the nobility of his nature, with its rare union of tenderness and vigor, enthusiasm for knowledge, whole-hearted devotion to duty, and the most unbounded eagerness to be useful and helpful to all around him.

Of all the men whom I came in contact with in the United States during my visit in 1879, none has left a more vivid and delightful impression on my memory than William B. Rogers.

Excuse these brief and hurried lines, written to catch the first post after the receipt of your letter.

Yours very truly,

(Signed)

ARCH. GEIKIE.

## THE TECHNOLOGY FUND

The work of building up the Income Fund has gone on steadily since the last issue of the REVIEW. The organization therein outlined has been further perfected, and the various sub-committees have co-operated with the central committee with energy and success.

At a general meeting of the Technology Fund Committee in November the suggestion was made that a handsome Alumni Fund on December 7, the one hundredth anniversary of President Rogers's birth, would be a most fitting tribute to the memory of the founder of the Institute. The energy with which this idea was taken up, and the enthusiasm with which it was received by the alumni, are shown by the fact that in the seventeen days ending on December 7 pledges were made exceeding \$60,000. To-day (December 28) the total of the fund is above \$203,000.

A recent circular of the Technology Fund Committee restates concisely the purpose of the Income Fund, as follows:—

*First.* To promote the development of the Institute by supplying funds to be used toward paying the current expenses of the next five years, during which the Endowment Fund will be secured.

*Second.* To show that Tech men are ready and willing to do their share toward the support of their Alma Mater before appealing for aid to the outside public.

*Third.* To divorce the merger question from that of finance.

On this broad platform certainly all can stand. This movement is, in fact, appealing to an ever-widening circle of alumni. With a better understanding of the purpose of the fund, men of the most diverse opinions on the many other questions affecting the Institute are becoming more and more united in the desire to contribute to her support.

## GENERAL INSTITUTE NEWS

## CORPORATION NOTES

The December meeting of the Corporation was held on the 14th, the main business consisting of the presentation of the annual reports of the President and Treasurer. The following promotions, appointments, and changes in title were confirmed:—

*Promotions:* Associate Professor Harry E. Clifford to Professor of Theoretical Electricity; Associate Professor Frank Vogel to Professor of German. *Appointments:* Major John Bigelow, Jr., U.S.A., retired, as Professor of French and head of the Department of Modern Languages; Carl King as Assistant in Mechanical Engineering; Henry Tebbets Rollins as Assistant in Mechanical Engineering; Maurice Walter Carty as Assistant in Mechanical Engineering; John Whitman Shaw as Assistant in Geology; Richard Chace Tolman as Assistant in Technical Analysis; Arthur Eugene Swan as Assistant in Physics; Charles Joseph Emerson as Assistant in Heat Measurements. *Changes in Title:* Dr. F. Jewett Moore to Assistant Professor of Organic Chemistry; Dr. Henry Fay to Assistant Professor of Analytical Chemistry.

At the close of his address at the Rogers Commemoration, President Pritchett announced the establishment by the Corporation of an annual scholarship of \$300, for graduates of William and Mary College to be known as the William Barton Rogers Scholarship. The awarding of this scholarship is to rest with the Faculty of that college.

## NEWLY APPOINTED HEADS OF DEPARTMENTS

Following the resignation of Dr. Louis Duncan as head of the Department of Electrical Engineering, Harry E. Clifford, '86, who has been for a number of years Associate Professor of Theoretical Electricity, was promoted to a full professorship, and has been

placed in charge of the department. Professor Clifford has been connected with the Institute for many years, and has proved himself an exceptionally good teacher and an administrator of much ability, while his extended acquaintance with men in professional practice will be of much value to the department.

Major John Bigelow, Jr., U.S.A., retired, who has been appointed head of the Department of Modern Languages, is the son of the Hon. John Bigelow, former minister to France. He was educated in Paris, Bonn, Berlin, and Freiberg, and was graduated from West Point in 1887. He was Professor of Military Science at the Institute from 1894 to 1898, when he went to the front in the war against Spain. He was wounded in the attack on San Juan, and was promoted Major in 1903.

#### REGISTRATION NOTES

Among points of interest in the statistical portion of the President's report, the following may be noted: The number of the members of the Faculty has declined from 69 to 65, but assistants and instructors are more numerous by 6 than last year. In the student body there are increases of 21 in the fourth year, 43 in the third year, and 52 in the first year, partially offset by the decrease of 97 in the second year. The number of fellows and graduates of the Institute shows a conspicuous gain from 18 to 32. The total number of students has increased from 1,528 to 1,561. The proportion of regular students above the first year is considerably reduced,—from 765 to 681,—partly in consequence of the number in the second year having deficiencies in modern languages in connection with the recent advance of entrance requirements. There is an increase, however, in Civil, Chemical, and Sanitary Engineering. There are, for the first time, no regular students in Course IX. The number of five-year students shows a considerable loss,—from 61 to 34,—which may be, however, less significant than it seems, because the boundary line between five-year and special students is always somewhat elastic.

Among subjects of instruction it may be noted that mathematics



lacks but 10 of reaching 1,000, the next highest being physics with 880, followed in order by chemistry and English.

The table of residences shows an increase from 57 to 58 per cent. for Massachusetts, while the number from foreign countries has increased from 50 to 60, the new countries represented including Central America, Ecuador, France, Jamaica, Korea, Sweden, the Transvaal, and Turkey. The number from China has increased from 2 to 8, while that from Mexico has fallen off from 8 to 4. The average age at entrance is still eighteen years and nine months.

The graduate students number 182, and represent 87 institutions. The table of Institute graduates shows a grand total of 3,132, mining engineering having just passed architecture in the number of its graduates. The number of scholarship holders thus far this year is 247, including 73 who receive half or full State scholarships. With the more extended application of the new tuition fee the need of larger resources for this purpose becomes more and more urgent.

#### PUBLICATIONS

The annual catalogue was issued the present year on the exceptionally early date of December 1. This result was naturally facilitated by the relegation of the former Register of Graduates to a separate volume, but particularly also by the energetic efforts of Professor Bartlett as chairman of the Faculty Committee on Publications. The catalogue of 1903-04 represented a very complete revision from previous issues, which it was not, of course, necessary to repeat in the present year; and there have thus been relatively few changes of a comprehensive character. The most conspicuous change appears on the cover and title-page in consequence of the change to the serial form, including as other numbers the President's Report, the Register of Graduates, and the Programme. This entitles all these publications to acceptance as second-class mail matter.

Mention may also be made of a general illustrated pamphlet giving a brief account of the foundation, character, and equipment of the Institute, issued in connection with the St. Louis Exposition.

The pamphlet opens with portraits of President Rogers and President Pritchett, and is further illustrated in connection with the text. It treats briefly of the foundation, purposes, and standard of scholarship, of the terms of admission, of the courses of instruction, and of libraries and laboratories in a generally less technical manner than is employed in the catalogue and department circulars.

#### OPTIONAL GENERAL STUDIES IN THE THIRD YEAR

As previously noted in the REVIEW, the advance of entrance requirements in modern languages, first taking effect with the class of 1907, was followed by a Faculty vote assigning one hundred and twenty of the two hundred and seventy hours released to optional general studies, including the history of science. A special committee of the Faculty has just reported a programme of such options, including in the first term Economic History, Comparative National Government, International Law, Advanced English Composition, English Literature of the Eighteenth Century, French, German, Spanish, and the History of Science. In the second term the courses offered are Railroads, Banking and Finance, Labor Problems, Industrial Organization, Municipal Government, Colonial Systems, European Civilization and Art, Contemporary Literature, English Literature of the Eighteenth Century, and the continuation of French, German, and Spanish.

It is the policy of the Faculty to offer the individual student entire freedom of choice of these general options, except as in particular cases this might lead to duplication of required work.

#### ADMISSION TO SECOND-YEAR WORK

REVIEW readers of a certain period may recall an earlier Faculty requirement of certain "credits" in the first-year work for admission to second-year professional subjects. With the discontinuance of the record H, credit requirements were also abandoned. It has appeared, however, in recent years important to make some restriction on the validity of L (passed with low standing) as a

qualification for admission to professional subjects; and, under the newly adopted rule, this record will generally prove insufficient in the case of first-year Mathematics, Chemistry (for chemical courses), and Descriptive Geometry.

#### GIFTS AND BEQUESTS

Through the generosity of Mr. Samuel Cabot of the Corporation the Institute has acquired additional property on Edgehill Road and Cumberland Avenue, Brookline, near the new athletic field, consisting of a house and other buildings and about twenty-seven thousand feet of land.

By the will of Mrs. Ednah D. Cheney the Institute is left \$10,000, for the maintenance and care of the Margaret Cheney Reading-room.

By the will of Macy S. Pope ('92), of East Machias, Me., whose recent sudden death was such a shock to his many friends, the Institute is to receive the sum of \$25,000. Mr. Pope leaves an equal sum to an academy in Machias, and \$10,000 for the founding of free beds in a Maine hospital.

An anonymous alumnus has given the nucleus of a Walker Memorial Library, consisting of about three hundred and seventy-five books and ten magazines relating to athletics and gymnastics. The collection is very valuable and remarkably complete, and is placed, for the present, in the general library.

#### LOUISIANA PURCHASE EXPOSITION AWARDS

Technology is the winner of six prizes, as follows:—

A grand prize for General Exhibit, a gold medal for Mining Engineering Exhibit, a silver medal for special exhibit of Analytical Chemistry, a silver medal for special exhibit of Drawing, a silver medal for special exhibit of Photography, Students' Work, etc., a bronze medal for special exhibit of Transparencies.

These six prizes were awarded to the M. I. T. Exhibit in the group of higher education, which included all the colleges and universities, scientific, technical, and engineering institutions, professional schools, libraries, and museums represented by exhibits.

## GENERAL NOTES

Dr. Thomas M. Drown, president of Lehigh University, died Thursday, Nov. 19, 1904, at his home at Bethlehem, Pa. An extended notice of this distinguished man, so beloved by all Institute students who were fortunate enough to come under his teaching, will appear in the April number of the REVIEW.

Professor Samuel C. Prescott has been appointed one of the collaborators of the leading bacteriological journal of Germany. He will be associated with eminent specialists from Germany, Denmark, Austria, Russia, England, Holland, and Sweden.

During the Christmas vacation a meeting of the Archæological Institute of America was held in the Walker Building.

Many members of the Chemical Department attended the meeting of the American Chemical Society held at Philadelphia, under the presidency of Professor Noyes, in connection with the Convocation Week of the American Association for the Advancement of Science. Professor Dewey took part in the joint meeting of the Economic and Historical Association at Chicago, and Professor Tyler in that of the American Mathematical Society at New York.

The Instructors and Assistants at the Institute have formed an Instructors' Club, with E. S. Foljambe as president, N. R. George, vice-president, and E. Kenison, secretary and treasurer. It will hold a dinner every month during the college year.

From the Boston *Herald* of Dec. 10, 1904: "Colonel John C. Chadwick, of Salem, died at his home in that city last night. He was born in Salem, July 30, 1833, and had lived there most of the time. In 1861 he assisted in raising and drilling two regiments before proceeding to Lynnfield as adjutant of the Nineteenth Massachusetts. After much service he was made captain of the color company of the Nineteenth Massachusetts, and was in the 'Forlorn Hope' which crossed the river in boats under fire at Fredericksburg. After the war, while in South Carolina, Mr. Chadwick held two government positions. He was later an instructor at the Institute of Technology."

## DEPARTMENT NOTES

## CIVIL ENGINEERING

The civil engineering students have made during the past few weeks excursions to the new Cambridge bridge, through the East Boston Tunnel, and to the Boston Bridge Works. All of these were very interesting and very profitable to those who took part in them.

The Civil Engineering Society has held a number of very interesting meetings during the fall. The first meeting was addressed by Professor Swain, who spoke on the Outlook for Civil Engineers and the Objects of the Society. The next meeting was addressed by Mr. J. E. Cheney, assistant engineer of Boston, and one of the ablest bridge engineers in the country, on the New Cambridge Bridge. At the third meeting Mr. F. E. Winsor spoke on the Charles River Dam. The last meeting was addressed by Mr. F. E. Matthes, '95, on Life in the Service of the United States Geological Survey.

## MINING ENGINEERING

The following account of the Summer School in Mining Engineering has been prepared by Charles E. Locke, Instructor in Mining Engineering and Metallurgy:—

This year has marked a decided step in advance in the Mining Summer School work. The old scheme which has been in vogue since the inception of this work by the late Professor Runkle in the Colorado trip of 1871, except in 1888, 1890, and 1892, has been to make trips to study mines and works in a brief way. The course has been optional, the time spent has been short, generally not over three or four weeks, and the region visited has, with one exception, been east of the Mississippi River, with the object of keeping the expenses low and of enabling the maximum number of men to attend. A similar scheme has been followed by other mining schools, although in some of them attendance has been required.

While Tech classes have met with uniformly cordial receptions, and their entertainers have shown a willingness to help the young

men in every way to get at the practical side of things, even though it was no unusual thing to find that the Tech party had been preceded by one or more parties from other schools, still it was felt that the increase in the number of school parties year by year threatened to impose serious burdens upon the mine superintendents and the managers of metallurgical works. Each visit was in a way a trespass upon the favor of these kind friends, and any change which would satisfactorily relieve the situation would be welcome. Moreover, as the work was almost entirely of a visiting nature, the student was given an opportunity only to watch others work; but, with an occasional exception, such as in mine surveying, he was unable to participate in the operations.

This was the condition of affairs when Professor John Hays Hammond, the new head of the Mining Department of the Sheffield Scientific School of Yale University, took up the study of the problem. The idea which came to him was to have a union professional school in mining, which should even go so far as to give the student the practical training which he had hitherto been able to obtain only by serving a sort of apprenticeship in actual work, and which is necessary to make the man competent to fill mining positions.

Professor Hammond was able to interest Mr. George F. Crocker, of California, in his idea; and early in the year he arranged for a meeting in New York to discuss the matter. At this meeting were present Professor Hammond, Professor Henry S. Munroe, of the Columbia School of Mines, Professor Robert H. Richards, of the Massachusetts Institute of Technology, and Professor Henry L. Smythe, of the Lawrence Scientific School of Harvard. The outcome was the formation of the Crocker Summer School of Mining, of which the four above-named gentlemen constitute the executive board; and Professor Munroe was elected director in charge for this year. Mr. Crocker donated the sum of \$12,000 for carrying on the work. The school was to be open to the members of the Junior and Senior Classes in the four colleges represented, and in addition, by courtesy, to the college which was in proximity to the location of the school. The methods of conducting the school work which have

been developed by Professor Munroe, of Columbia, were adopted as the scheme for this school.

On June 11 the party of twenty Tech men, together with forty-two men from Columbia, arrived in Silver Plume, Colo., which had been selected for the location of the school this year. Here they met their instructors, who had preceded them several days in order to make the necessary arrangements of purchasing drills, laying pipe line, laying out the surveying work, engaging the practical miners, getting accommodations ready, etc. They found themselves in a very pleasant little mining camp in the heart of the Rockies, about fifty miles west of Denver, nine thousand feet above sea-level and just above the famous Georgetown loop. The fall in price of silver and lead in recent years had detracted somewhat from its old-time glory, and nothing apparently remained of its "boom" days but the record of the millions that had been removed from its mines. But beneath all the quiet was found a steady metal output, largely obtained from mines worked on the so-called leasing system. One of the famous old mines, the Dives-Pelican, had been selected, and one portion of it, the Burleigh Tunnel, had been leased for the actual mining work of the school, while free access was had to other portions for surveying, timbering, sampling, etc.

The required course was six weeks, and the programme included the following: drilling and blasting, one week; timbering, one week; mine surveying, one week; milling (at Idaho Springs, fifteen miles east), one and one-half weeks; mine sampling, one-half week; visiting at Breckenridge, one-half week; study of mine plant, one-half week. This last was taken by most of the Tech men at Cripple Creek later. An additional week of extra mine plant work at Cripple Creek was offered as optional work, but was not taken by any of the Tech men. All work, as far as possible, was done by the students personally, with the direction and assistance of experienced miners. Note-books were required everywhere, and these were handed in for correction at the close of the day's work. Sketching was made a strong feature of the notes.

Further optional work at Silver Plume was offered in the form

of weekly smoke-talks by prominent mining men of Colorado. These consisted of an address, followed first by a discussion and usually later by a dance. Courses not on the original program were the celebrations of June 17 and July 4. The former was entirely a Tech affair. The latter was participated in by the whole camp; but in the students' drilling contest, which was the feature of the day, two Tech men took the first prize, with a record of  $9\frac{3}{4}$  inches drilled in ten minutes. The work of two exhibition drill men at the same time was eleven inches in five minutes.

On June 25 the students from Harvard and Yale arrived. This made the total enrolment of the school as follows:—

	<i>Instructing Staff.</i>	<i>Students.</i>
Columbia . . . . .	5	42
Technology . . . . .	3	20
Harvard . . . . .	2	11
Yale . . . . .	2	8
Total . . . . .	12	81

Men were expected from the Colorado School of Mines at Golden, but they were unable to come through lack of an instructor to accompany them. On July 18 the majority of the Tech men, forming a party by themselves, left Silver Plume for a two weeks' trip, one week to be spent on the required summer school work and one on visits to various metallurgical plants. Rather than make the trip by rail, going back to Denver and then out to Breckenridge, it was decided to go over Argentine Pass, using horses and wagons. First-class passengers rode over on horseback. Second-class passengers rode in wagons to the foot, walked up on one side, rested at the divide, and then walked down the other side to the foot, where wagons met them to convey them to Breckenridge. Two days were spent here in the placer mines studying the hydraulicking and dredging operations of the American Gold Dredging Company and the hydraulicking and elevating operations of the Gold Pan Mining Company. The car trip from Breckenridge to Denver was very representative of the feats of mountain railroading, and included a climb to timber line at 11,000 feet above sea level and passage



through snowsheds and over grades that make one wonder what would happen if the train should break apart.

The metallurgical part of the trip began with two days in Denver. One day was spent in the Globe lead smelter of the American Smelting and Refining Company, and one in the Argo copper smelter of the Boston and Colorado Smelting Company. One day was devoted to the Standard chlorination plant of the United States Reduction and Refining Company at Colorado City, and the following day, being Sunday, gave the men a chance to view the natural beauties of Colorado Springs and its environs. Three hours' ride over another famous scenic route landed the party in Cripple Creek, the largest gold camp in the country to-day and the magnet to which every student was drawn. Three days here and in Victor were devoted to "mine plant" work. The men studied the surface plants of the larger mines of the district, and were also able to personally observe the methods of underground work in the famous Portland mine, the largest in the camp. The zinc works of the United States Smelting Company at Cañon City and the cyanide plant of the Dorcas Mining, Milling, and Development Company at Florence were both visited in one day. The last two days of the school were spent in Pueblo, one at the large plant of the Colorado Fuel and Iron Company, where were seen iron blast furnaces, Bessemer plant, open hearth furnaces, rolling mills, and wire mills, and the other at the smelter of the United States Zinc Company.

Looking back, the school appears to be one of the most successful ever attended by Tech men. The cost, which, as shown by a canvass, ranged from \$175 to \$300 per man, according to the amount of extras indulged in, is not high, when one considers the knowledge gained in return. The scope of the school was so broad that the men were enabled to get an idea of all the important operations in mining and metallurgy, with the exception of coal mining. The cordial reception which was met on every hand led them to inquire well into the details of things. The mingling of students and instructors from the various schools gave each a chance to observe the methods of the others and to profit thereby. Such a school seems to be a move in the right direction, and it is to be hoped that

means will be provided whereby it may not only become a permanent thing, but also that it may be so extended that a man may have an opportunity actually to participate in other branches of work, such as milling, and possibly even metallurgy, in just the same way as he was able to drill, blast, and timber this year.

#### CHEMISTRY AND CHEMICAL ENGINEERING

The withdrawal of Professors Whitney and Norris from the Institute has necessitated a partial redistribution of the courses of instruction, whereby the lectures in theoretical chemistry formerly given by Dr. Whitney are given by Dr. Brown, while those in electrochemistry are given by Dr. Goodwin, and Dr. Noyes assumes the oversight of the laboratory and thesis work. Messrs. Sosman and Haskell also serve as assistants in theoretical chemistry.

The lectures given by Dr. Norris are now under the charge of Professor F. J. Moore, who also assumes the control of the laboratory work in organic chemistry and organic analysis, the latter portion of the work being under the direct charge of Dr. Earle.

Professor Fay now has the direction of the entire instruction in inorganic chemical analysis, except that of the first year, the three laboratories being under the immediate charge of Dr. Sherrill and Messrs. Hall and Kneeland, respectively. The entire course of instruction in analytical chemistry is being carefully studied with reference, in particular, to its adaptation to the changed conditions in the Mining Engineering Course, but also with reference to all the professional courses concerned.

Professor Bardwell has resumed his duties at the Institute, and now has charge of the work in the first-year laboratory. This work is also being developed to include more quantitative experimentation, as well as a series of experiments illustrative of the simpler applications of the ionic theory. A number of balances and an extensive electrical outfit have been added to the equipment of the laboratories for this work. The lectures of the course are given by Professor Talbot, and the recitations are under the charge of Professor Pope.

There was a gratifying increase in the number of graduate students in chemistry at the opening of the year. Eight such students are candidates for the degree of doctor of philosophy, with chemistry as their main subject. This is, no doubt, the result of the establishment, under the direction of Dr. Noyes, of the Research Laboratories of Physical Chemistry; and most of these candidates are beginning researches in this field, although some are to take up work in organic and inorganic chemistry. It was found necessary to equip an additional room in the basement of Engineering C to accommodate these students.

The Institute was represented, on the chemical side, at the Congress of Arts and Science at St. Louis by Professors Crafts, Noyes, Walker, and Whitney, and Mrs. Richards. The chemical exhibit, in connection with the so-called "land-grant colleges," which was brought together under the direction of Dr. Walker and according to a scheme conceived by him, attracted much favorable comment and attention.

Mr. Stephen N. Mason, who has been private assistant to Professor Gill until the opening of this year, when he was appointed assistant in Technical Analysis, has resigned to accept a position with the American Woolen Company at Lawrence, and Mr. Richard C. Tolman has been appointed assistant in his place. Mr. Tolman has just returned from Germany, where he spent a year in study, partly at Berlin and partly at Crefeld.

Mr. R. S. Hatch, a graduate of Syracuse University, is serving as private assistant to Professor Moore, under whose direction he is conducting investigations in organic chemistry; and Mr. H. C. Keith, of Hamilton College, is acting in a similar capacity for Dr. Blanchard, and is continuing physico-chemical work in the field in which Dr. Blanchard has already published some papers.

Professor Talbot has been reappointed chief examiner in chemistry for the College Entrance Examination Board for the 1905 examinations. He has also been recently elected a councillor-at-large of the American Chemical Society.

The summer course of Industrial Chemistry, under the direction of Professor Thorp, was again a marked success. Twelve students

took part in the trip, which began on the 9th of June, and ended on the 25th. The weather conditions were exceptionally favorable, and no delays or mishaps of any sort interfered with the keeping of appointments.

About thirty plants, controlled by twenty-seven different concerns, were opened for inspection. Throughout the trip the students maintained a deep interest in the serious purpose of the excursion; and the evening conferences, lasting usually about two hours, were the occasion of animated and valuable discussions of observations and notes. In all, twenty-one of the works visited were thus discussed.

The names of the concerns visited were as follows:—

Arnold Print Works, North Adams, Mass.  
Stamford Chemical Company, Stamford, Vt.  
West Virginia Pulp and Paper Company, Mechanicsville, N.Y.  
American Hide and Leather Company, Ballston, N.Y.  
International Paper Company, Glens Falls, N.Y.  
Union Bag and Paper Company, Fenimore, N.Y.  
Salt Springs Solar Salt Company, Syracuse, N.Y.  
Crucible Steel Company, Syracuse, N.Y.  
Straight Line Engine Works, Syracuse, N.Y.  
Onondaga Pottery Company, Syracuse, N.Y.  
Empire Portland Cement Company, Warner, N.Y.  
Vacuum Oil Company, Olean and Rochester, N.Y.  
Worcester Salt Company, Silver Springs, N.Y.  
Rochester Glass Works, Rochester, N.Y.  
Eastman Kodak Company, Rochester.  
Curtice Brothers, Rochester.  
Bartholomay Brewing Company, Rochester.  
Pfaudler Company, Rochester.  
National Battery Company, Buffalo, N.Y.  
Lackawanna Steel Company, Buffalo, N.Y.  
Larkin Soap Company, Buffalo, N.Y.  
Buffalo Pottery Company, Buffalo, N.Y.  
Buffalo Smelting Works, Buffalo, N.Y.  
Standard Oil Company, Buffalo, N.Y.  
Pratt & Lambert Company, Buffalo, N.Y.

Natural Food Company, Niagara Falls, N.Y.

Niagara Falls Power Company, Niagara Falls, N.Y.

Niagara Falls Research Laboratory, Niagara Falls, N.Y.

Dr. Thorp writes:—

In many of these works we found former Institute men, and in every place we were received in an open and friendly way, which demonstrated that the Institute was highly respected, and it was made evident that we were not regarded as intruders. And not merely in the matter of visits to the works were we well treated. At several places lunches and dinners were provided for us, and numerous little mementoes of our visit were presented to us.

Especially at the Worcester Salt Company were we made welcome by Mr. W. B. Powell, general superintendent, and Mr. Nash, assistant superintendent, and later an excellent dinner was provided. Again, in Rochester, through the combined agency of Mr. F. W. Lovejoy and the six other Institute men and their colleagues in the works of the Eastman Kodak Company, we enjoyed a most pleasant Sunday afternoon tally-ho ride of several hours, viewing the sights of the city and its fine parks, and finally winding up with a fish dinner at one of the resorts on the lake. Then the next day at Kodak Park, through the courtesy of the company, we were again entertained at lunch on the lawn in front of the works. In Buffalo, at the works of Pratt & Lambert, we were very pleasantly entertained at dinner through the courtesy of Mr. W. H. Andrews, the general manager. Our visit here was especially interesting because of the short lectures upon the various materials and processes, delivered to us by the managers of the several departments. We were also presented with souvenirs of our visit here. Finally, at the works of the Natural Food Company, Niagara Falls, the party was given a neat lunch to illustrate the products of the company.

It is a gratifying tribute to the care with which Dr. Thorp planned the trip that the necessary expenses incurred by each student did not exceed the sum estimated; namely, \$80.

The reports upon the trip, which are required from each member of the party, will be filed in the Chemical Library.

Professor Walker also accompanied the party from June 13 to

## ELECTRICAL ENGINEERING

The system introduced this last year in the Dynamo Electric Laboratory, of having the men present a preliminary report on every experiment previous to performing the work in the laboratory, is giving excellent satisfaction, the men having gained greatly in power of initiative and independence in carrying on the work. These preliminary reports contain a discussion of the object and methods of procedure, as well as the instruments and apparatus required, and usually include answers to certain questions pertaining to difficulties which may arise or concerning the relation of the results to engineering practice. The laboratory work is being put more and more on the basis of illustrating fundamental theory rather than giving the students merely manipulative skill.

The power plant is being arranged for the carrying on of plant tests, and the changes and additions will be completed in time for the mechanical and electrical engineers of the Senior year to carry out a week's test, beginning Monday, January 2. It is intended to have the power plant in future used to a considerable degree by the students in the various courses of the Institute in connection with their work in the Mechanical Engineering Laboratory. This will place at the disposal of the Mechanical Engineering Department, therefore, the Russell and McEwen engines, together with the various auxiliary devices, including the Worthington cooling tower. In this way it is possible for all the students to get a much more comprehensive idea of the relation of the mechanical side to the electrical generation of power than has previously been possible.

Two of the present Senior Class are carrying out thesis work on a steam turbine plant of two 500 kilowatt units, with superheater, at Nashua. This work is being done in conjunction with four members of the Senior Class in mechanical engineering. In connection with thesis work carried on by two of the Seniors in naval architecture working in the Dynamo Electric Laboratory, the power of a six-cylinder gas engine is being determined by coupling it directly to a generator and measuring the electrical output. The

ease and convenience of measuring power by electrical means will undoubtedly bring about a greatly increasing use of this method.

Laboratory instruction is also being given to the naval constructors and to about seventy-five men in mechanical and mining engineering, who are carrying on optional work in connection with the course in Dynamo Electric Machinery. Undoubtedly in the near future this laboratory work will become an integral part of the curricula of various of our non-electrical engineering departments.

The Electrical Engineering Society held its first meeting at the Tech Union on November 11, and was addressed by Mr. Tobin, of the Vacuum Oil Company, on the subject of Lubrication. This was followed by a description of the plant of the Simplex Electric Company by Mr. Henry A. Morss of that company, preparatory to an excursion of the society to inspect the plant.

There has been introduced this year a system of excursions made by the men in small squads under the supervision of the department, the men being obliged to present formal reports, which are not only discussed with reference to their electrical features, but are also submitted for criticism and suggestion to the Department of English. The week of November 14 was devoted to an inspection of the electric light plant of the Newton and Watertown Gas Light Company, and the week of December 12 to the Lexington power house of the Lexington and Boston Street Railway Company.

The department is giving instruction both in lectures and laboratory work to the men in the second year of the course for the Lowell Institute School for Industrial Foremen, this instruction being given in the evening.

Mr. Odin Roberts, '88, a leading patent attorney of Boston, has just completed a course of six lectures on Patents in Relation to the Useful Arts, before the Senior Class in electrical engineering. These lectures have been thoroughly delightful and most instructive.

On Wednesday morning, November 30, Mr. Clarence Renshaw, '99, of the Westinghouse Electric and Manufacturing Company, gave an illustrated lecture to the third and fourth year students on the New Series Alternating Current Motor.

There have been many visitors to the laboratories of the department this fall, engineers and scientists who have been on their way either to or from the St. Louis Exposition, and all have expressed admiration for the equipment, and appreciation of our system of making the men do things themselves. Among the most interested of the visitors were Professor Ewing, who has recently been placed in charge of the system of engineering education in connection with the British Navy, and Professors Benoit and Le Blanc from Karlsruhe. On Saturday, September 3, the laboratories were visited by a delegation of about one hundred foreign engineers on their way to St. Louis.

In view of the attention which has been directed recently to a scheme of consulting professors, spoken of as an innovation at the Brooklyn Polytechnic Institute, it is well to remark that the system of outside lecturers to which this "innovation" is practically equivalent has been in vogue in this department for something like twenty years.

There is a large number of graduates from other institutions in the department this year, including one from the École Supérieure of Paris.

During the summer Professor Albert F. Ganz, head of the Electrical Engineering Department of the Stevens Institute of Technology, made a very careful inspection of our laboratories with reference to certain changes which he is about introducing in his own department.

A special committee of the Underwriters' National Electric Association recently conducted in the laboratory a series of tests upon a new type of safety fuse, which is later to be the only accepted standard in the country. The work of this committee is of national importance, and it is gratifying that the equipment of the department is sufficiently complete to enable tests like these to be satisfactorily carried on without any special prearrangement or interference with the regular work.

The beginning has been made on a systematic investigation of fuses, cut-outs, and circuit breakers, which is to extend through several years, being taken up by students for thesis work. It is



hoped that this may render possible a real contribution to the knowledge of this at present somewhat obscure subject.

Professor Clifford addressed the Alumni Association in New Bedford recently on the growth of the Institute and its present condition.

There has been recently conducted by Mr. Hyde of the department some tests on fan dynamometers, and certain very interesting results have been obtained. A single-phase alternating current series motor, with the necessary controlling devices, has been ordered from the Westinghouse Company, and will be available for thesis work this coming term.

Dr. Duncan's resignation as head of the department was accepted on October 15. He will devote himself to his large and somewhat exacting professional practice, with headquarters in New York. The Executive Committee has appointed Professor Clifford to a full professorship in Theoretical Electricity, and has asked him to take charge of the department pending the selection of a permanent successor to Dr. Duncan.

#### PHYSICS

The Department of Physics has recently received a number of important additions to its equipment of apparatus.

A number of pieces for demonstration have been received from Kohl, of Chemnitz, including several gyroscopic pendulums and Sire's polytrope for illustrating the effect of the rotation of the earth upon a gyroscope in any latitude.

Also a considerable addition has been made to the collection of vacuum tubes. There have been purchased from Müller-Uri, of Brunswick, several recently devised forms of spectrum tubes, and also a "vacuum scale" apparatus of very large dimensions of the type devised by Professor Cross, for illustrating clearly the changes in an electrical discharge due to changes in pressure throughout an extreme range.

Another important adjunct to the lecture work consists of a pair of Weston instruments of very large size. Each stands about twenty inches high, and has a scale two feet long. A few thousandths

of a volt will give on the voltmeter a deflection that can be read from any part of the room, and the ammeter has a corresponding sensitiveness. By suitable resistances the sensitiveness of either instrument can be reduced at will for the study of larger currents or voltages. They have already proved highly satisfactory in exhibiting thermo-electric effects to a large class.

The following additions have been made to the equipment of the laboratory of General Physics.

*a.* A new form of apparatus for determining the mechanical equivalent of heat, from the Cambridge Scientific Society of England.

*b.* A spectrometer, from the Société Gènevoise, provided with quartz lenses and accessories, so that it may be used for investigations with ultra violet light.

*c.* A Geneva comparator for calibrating thermometers.

*d.* A Geneva densimeter for specific gravity measurements.

In the Electrochemical Laboratory a new distributing board for the set of accumulators has recently been installed, which allows of any combination of the batteries in series or parallel. A set of G. E. current transformers for the measurement of heavy alternating currents used in electric furnace work, and a set of Weston direct current measuring instruments for electrolytic work, have also been received, thus completing the equipment of accessories to the power plant.

A still of special design for furnishing water of great purity for conductivity work has also been installed.

The unusual facilities provided for each student in this laboratory have been most favorably commented upon by numerous visitors from abroad this fall. In Germany, where laboratories devoted especially to electro-chemistry were first established, these are, in some cases, considerably larger than ours; but their equipment is admittedly inferior.

Dr. W. W. Jacques, M. I. T. '76, has given to the Institute the sum of \$1,000 per year for five years, to be devoted to the purchase of apparatus for the Physical Department, in addition to the usual annual appropriation.

## THE UNDERGRADUATES

## THE POLICE CONFLICT OF NOVEMBER 2

On this date the students of Harvard and of the Institute, as has been customary, took part in a Republican Torchlight Parade over some of the streets of the Back Bay. The Harvard men, about one thousand in number, wore gowns and caps of crimson, while the Institute men, to the number of eight hundred, wore white overalls and workman's caps. The parade passed off without delay or, as was feared, conflict between the two bodies of students; but, as the Institute men attempted to follow their usual custom of cheering on the steps of Rogers before dispersing, the police, who had been posted in large numbers before the Institute grounds, drove them from the steps and along Boylston Street with much brutality.

At a special meeting of the Executive Committee of the Corporation, held the following morning, it was

*Voted*, That the President be requested to collect evidence about the conduct of the police on Wednesday evening, November 2; and that he, with Messrs. A. Lawrence Lowell and Howard Stockton, be a committee to proceed against the officers guilty of brutality.

The progress of the subsequent inquiry is clearly given in the following extracts from the Report of the Police Commissioners made, at his request, to the Governor of the Commonwealth:—

Proper details of police from the various stations were ordered; and, after performing duty along the route of this joint parade, these details were ordered to concentrate on Boylston Street, and there report to Captain Hall, commanding Police Division 16. When they all arrived, he had under his command one lieutenant, nine sergeants, one hundred and fifty-five foot officers, and eighteen mounted officers. He also had explicit instructions to prevent any trouble.

During the evening of November 2 a lecture was to have been given in

Huntington Hall, in the Rogers Building, at which an audience of about one thousand people (many of whom were to be ladies) was expected to be present. A law class was also to convene in another room in the same building. The lecture was over at about nine o'clock, and by a quarter-past nine that audience had departed, and the front doors of the Rogers Building were immediately locked. The law class departed about half-past nine o'clock, and had to leave by the rear door on Newbury Street because the front doors had been locked, and, apparently, the custodian with the key had departed.

During the afternoon of November 2 the President of the Institute of Technology directed the Bursar to see Captain Hall, and arrange for proper police protection for the evening,—“to look after the steps and keep the steps clear,” as he testified.

The Bursar saw Captain Hall at the police station, and arranged that every one should be kept off the grounds of the institution, and particularly from the steps of the Rogers Building. Nothing was said to Captain Hall about the lecture of the law class.

This parade had been in preparation by the students of the two colleges for a week or ten days. It was considered certain that the usual clash between them would take place, and preparations were made accordingly.

The Faculty of each college admonished the students to avoid the customary collision, and it was probably owing to this influence, assisted, perhaps, by the strong police detail, which prevented any trouble between the two parts of the parade.

The place where the Harvards feared trouble (according to their marshal's letter) was on Commonwealth Avenue, and where the Techs feared trouble (according to previous experience and tradition) was at the Rogers Building. At the corner of Beacon and Charles Streets the Harvard marshal announced to the mounted sergeant in charge of his escort that the Harvard men would proceed up Beacon Street to Massachusetts Avenue, and go home over Harvard Bridge.

As soon as the Harvards had passed, a strong detail of foot police was swung across Beacon Street; and the Technology part of the parade proceeded via Charles and Boylston Streets to the Institute grounds. The foot police followed the Harvards up Beacon Street as far as Berkeley Street to prevent any demonstration against the Technology grounds from that direction. Some policemen were stationed on Newbury Street in the rear of the Rogers Building, and others were posted, a short distance apart, along the sidewalk on Boylston Street from Clarendon Street to Berkeley Street to protect the front of the Technology grounds. Three police officers were stationed

on the steps of the Rogers Building, and a line of officers, standing close together, was posted across the entrance to these steps at the sidewalk. Some of the witnesses thought officers must have been placed inside the Rogers Building. They said that it appeared from where they were looking on as if the officers came out from the building, and attacked the students. This is an error, for no officers were inside the building, and the front doors were locked, so that even the President of the Institute could not get out on the steps.

When the head of the Technology procession reached the corner of Boylston and Berkeley Streets, the chief marshal saw the police on the steps, and also the line of officers across the opening which leads to the steps. Not knowing what they were there for, he ran ahead of his procession, and asked Lieutenant Walkins, who informed him that the police were there "to keep the men off the steps." He asked if that "included the Tech men as well as the Harvard men," and the lieutenant said, "Yes." The marshal immediately went to the head of his procession and ordered the band not to stop, but to proceed up Boylston Street, thinking to carry the procession with him by so doing. The band obeyed, but the procession, not knowing what was desired, did not follow, but halted with the front ranks at Clarendon Street and the columns standing in the gutter along the sidewalk in front of the Technology grounds and extending nearly to Berkeley Street.

The police supposed that the Technology students had been informed that the police were there to keep the steps clear from them and every one else. The request of the bursar had not been recalled nor modified in any way. The police supposed that the students understood the situation as the police did. But the students had not been informed of this, and regarded the presence of the police as an interference with their time-honored privilege of cheering upon the steps of the Rogers Building.

The column remained standing for several minutes, each class indulging in its college yells and cheers. Suddenly, and without any warning or inquiry, those opposite the entrance to the Rogers Building started for the steps, and the students on the right and left converged toward them, thereby forming a wedge. In this order they rushed through the line of police and swarmed up the steps.

The police officers who were on the steps claim that the students assaulted them and attempted to throw them down the steps. Several of them testified that they were seized by a number of students and thrown down. The students, on the other hand, claim that, when they came up the steps, no attempt was made to prevent them from going up, and that the officers

drew their clubs and assaulted them and drove them off the steps without any provocation.

As nearly as we can ascertain, there were one lieutenant, three sergeants and twenty-seven patrolmen on different parts of the steps, and about three hundred students. A struggle took place, in which the officers used their clubs and the students their torches and torch handles. Other students on the ground threw their torch cans, partly filled with oil, some lighted and some not lighted, at the officers.

Clinkers from the ash barrels and also other missiles were thrown at the officers. This struggle was soon over, lasting less than two minutes, and the students were driven from the steps. At the foot of the steps the fight was renewed.

Most of the students retreated down Boylston Street to Clarendon Street, and gathered in groups at Trinity Church and on the sidewalk in front of Metcalf's drug store.

The students were shouting, "Tech, this way!" and the crowd was increasing and becoming more violent in their demonstrations. Then the sergeant ordered the sidewalk in front of Metcalf's drug store, from which the missiles were hurled, to be cleared. He, with three other mounted police officers, rode upon the sidewalk, and the crowd gave way in front of them and scattered, and there was no further trouble there.

The lawn and the grounds of the Institute were finally cleared of the students and people. Some of the cooler-headed students came to Captain Hall, and requested permission to go upon the steps and cheer, and promised that no more trouble should be made if this was done. Upon this assurance he gave his consent, and the students assembled on the steps and gave their cheers.

As a result of this affair, sixty-six police officers were more or less injured, and eight horses were cut with missiles or burned by lighted torches which were thrust under or against them by the students.

On the other side, it is claimed by the attorneys employed by the Institute that one hundred and seven students and eight spectators were struck and more or less injured, making one hundred and fifteen in all.

The hearings commenced November 11, as soon as the Technology authorities were ready, and ended December 7. At the close of this investigation the board of police decided to prefer charges against eleven officers. These charges were for "neglect of duty," with various specifications alleging in substance that they neglected to restrain the men under their commands from using excessive force and violence.

The trials commenced December 14, and proceeded as rapidly as possible, and were concluded December 22.

The conflict of testimony between the officers and students is very great, and the facts and circumstances are undoubtedly highly colored and exaggerated upon both sides.

Concerning the students who claim to have been hurt we are informed by their counsel that "the actual physical consequences are not serious." Some received blows upon the head, which cut the skin, from which the blood came, and which required the services of physicians and some stitches and bandages. Twenty-two students were photographed, and the photographs put in evidence, showing the position of the blows, and the claim is made that they were struck from behind upon the back or side of the head, when they were making no resistance, and were, in fact, trying to get away.

We find that excessive force was used, and that the police in performing their duty did not use that prudent and careful forbearance, intelligence, tact, and coolness which should be required of a well-disciplined and highly efficient police force, accustomed to handle crowds and processions in a great city like Boston.

It is the duty of the police to enforce the laws, to preserve the peace, and to protect the public from lawless assemblies. It is also their duty to do this with coolness and good judgment. They should not "lose their heads" because others do so. They should be patient and forbearing in the midst of excitement, and resort to force only when more peaceful means have been tried without success.

For these reasons we have found that Captain George A. Hall is guilty of neglect of duty, and sentenced him to be reduced to the rank of lieutenant.

We have found Lieutenant Henry J. Walkins guilty of neglect of duty, and sentenced him to be reduced to the rank of sergeant.

We have found Sergeants Richard Fitzgerald, Hayden J. Ringer, and James E. Sanford guilty of neglect of duty, and sentenced them each to be reduced to the rank of patrolmen.

We have found Sergeants William J. Sheehan, Frank Arnold, Ernest R. Taylor, and Thomas F. Good, Jr. (who did not participate in the first and worst trouble), guilty of neglect of duty, and sentenced each of them to 'forfeit thirty days' pay.

We have found Sergeants Daniel F. Eagan and George H. Guard not guilty, and ordered the several complaints against them to be dismissed.

None of the evidence identified any patrolman who used his club. If any such patrolman could have been identified, we should have proceeded against him also.

(Signed)

W. H. H. EMMONS,  
C. P. CURTIS, Jr.,  
H. F. ADAMS,  
*Board of Police.*

#### SOCIETIES AND CLUBS

The various professional societies have, as usual, held frequent meetings, with interesting papers from men actively engaged in professional work.

*Civil Engineering Society.*—On December 10 two hundred members of the Civil Engineering Society made a trip through the new East Boston Tunnel, the many interesting features of the work being pointed out by members of the engineering corps of the Boston Transit Commission.

*Walker Club.*—A reception given by the Walker Club to men who have come here this year from other colleges was held at the Technology Club October 28. Over a hundred attended. Mr. Guy Lowell, '94, president of the Technology Club, welcomed the guests. W. C. Marsh, '05, president of the Walker Club, spoke on behalf of that club, and was followed by S. A. Greeley, '05, who told of some of the opportunities for graduates of other colleges to take an active part in the non-technical undergraduate work. Dean Burton emphasized the necessity that Tech students take an active part in some form of undergraduate activity, and Dr. Pritchett concluded the talks with reminiscences of German student life.

At a meeting of the club Nov. 19, 1904, the following resolutions were passed:—

Whereas death has removed our fellow-member, John Arthur Fremmer, therefore,

*Resolved*, That the Walker Club wishes to express its sense of his manliness, his ability, and his winning personality, and its deep feeling of sorrow at his untimely death.

*Resolved*, That it extends its sympathy to the members of his family, the



more sincerely from its appreciation of how great is the loss which they have sustained.

LOUIS N. HAMMETT, *Sec'y.*,  
HENRY GREENLEAF PEARSON,  
*Committee of the Walker Club.*

*Civic Club.*—The first regular meeting was held at the Tech Union October 11. Mr. Laurence Minot, chairman of the Good Government Association of Boston, spoke on the history of Boston municipal affairs. The November meeting was held November 15, at the Union. An informal debate was held on the subject, "*Resolved, That State Control of the Police is Detrimental to the Efficiency of the Force.*" The men on the affirmative were Mr. Hinkley and Mr. Blodgett, and the negative side was taken by Mr. Breitzke and Mr. Orcutt.

*Musical Clubs.*—The winter concert and dance was held at the New Century Building on December 21. The matrons were Mrs. George F. Swain, Mrs. Dana P. Bartlett, Mrs. William H. Walker, and Mrs. Henry G. Pearson.

*Saturday Kommers.*—The first Saturday night dinner took place December 3, under the charge of the Senior Class who presented a very amusing Mock Trial. On Saturday, December 17, the Sunshine Minstrels, organized by the Junior Class, gave a show which, in view of its informality and slight preparation, was extremely good.

#### ATHLETICS

##### THE NEW ATHLETIC FIELD

The new field on Pond Avenue, Brookline, has been fitted up with a quarter-mile track, a straightaway of 135 yards, a baseball diamond, football field, and tennis courts. There is also a grand stand with a seating capacity of 750, bleachers seating 600, and commodious dressing-rooms. The field is surrounded by a substantial fence.

The cost has been borne by Mr. George Wigglesworth, Treasurer of the Institute.

## FIELD DAY

The Fourth Technology Field Day took place at the new Athletic Field in Brookline, and was attended by about fifteen hundred people. The day was a good one for outdoor sports, and the winning of the cross-country race by the Institute was a pleasant beginning to an interesting afternoon.

The first event, the football game, was won by the sophomores; with a final score of 22 to 0. The second event, the relay race, was very close throughout, neither class at any time leading by more than twenty feet; and the final result was a dead heat. The tug-of-war, which was the third event of the afternoon, was won in a minute and a quarter by the Freshman team. The make-up of the football teams was as follows: Sophomore team, O. H. Starkweather, A. Seymour, R. H. Parlin, S. A. Marx, M. McLeod, O. L. Peabody, G. H. Chapman, S. C. Godfrey, J. Tetlow, C. R. Lamont, F. H. Fuller, F. E. Elder, J. M. Frank, J. Coupel, and L. D. Davenport; Freshman team, E. R. Smith, G. T. Glover, H. Child, S. Hall, Jr., A. Ellis, H. A. Rapelye, G. A. Joslin, J. S. Barnes, H. R. Putnam, Jr., C. H. Boylston, L. S. Gerould, W. R. Heilmann, M. E. Allen, W. B. Given, Jr., E. I. Williams.

## FIELD-DAY DINNER

About one hundred and fifty men were present at the usual Field Day dinner given by the Advisory Council on November 14. Mr. Samuel Cabot, Mr. Rand, Mr. Wigglesworth, Dean Burton, Mr. Batchelder, and Mr. Briggs all spoke.

## CROSS-COUNTRY RACE

The cross-country race with Harvard was held on Field Day, being planned to finish before the afternoon exercises began. The Institute won from Harvard, E. H. Lorens being first and H. R. Callaway third.



The Cabot Medal

## NEW HOCKEY RINK

The old Park Square station has been leased, and a standard rink for the playing of games with other New England colleges has been built entirely by Institute men.

## GYMNASTIC TEAM

A meeting of men interested in forming a gymnastic team was held at the gymnasium December 1, and was addressed by Mr. Towne, the instructor in gymnastics. Graham and Defren were elected captain and manager, respectively; and the team will practise every day from four to six.

## THE CABOT MEDALS

The Cabot medals for the year 1903 and 1904 were awarded to the following students: F. B. Poole, '05; J. C. Damon, '04; and J. P. Stow, Jr., '07; while the following received honorable mention E. T. Henius, '06; E. M. Graham, '05; W. B. Boggs, '04; V. H. Paquet, '05; and P. J. Ralph.

## CONVOCATIONS

The first general convocation was held on October 27, the speaker being Rt. Rev. Charles H. Brent, bishop of the Philippine Islands, who spoke upon those islands as a field for future scientific work.

The second convocation, held December 14, was addressed by Booker T. Washington, who spoke upon his well-known work in the education of the colored race.

## GENERAL NOTES

"Lectures on the Choice of the Courses" for the Freshman Class were given as follows: Messrs. Sedgwick, Swain, and Clifford, December 17; Professor Lanza and Talbot on December 19.

The intercollegiate geological excursion for teachers and students of geology was held at Worcester, October 22. About forty representatives from the Institute, Harvard, Yale, Amherst, Williams, Worcester Polytechnic, Smith, and Mt. Holyoke were present.

The following men have been chosen to manage the Tech Show in April: P. E. Hinkley, general manager; K. E. Terry, stage manager; R. W. Parlin, business manager; R. G. Kann, assistant stage manager; and F. S. Hamilton, assistant business manager.

## THE GRADUATES

## THE ASSOCIATION OF CLASS SECRETARIES

## EIGHTH ANNUAL MEETING

The eighth annual meeting of the Association of Class Secretaries was held at the Technology Club, Boston, on Tuesday evening, Nov. 15, 1904, C. T. Main, '76, being chosen chairman of the meeting, and thirty-two members and representatives being present. The election of officers for the ensuing two-year term resulted in the re-election of the present officers, Frederic H. Fay, '93, secretary, and Charles F. Read, '74, assistant secretary, by unanimous vote.

C. F. Read, chairman, presented the report of the Committee on Closer Relations among Graduate Organizations. Progress has been made by the committee during the past year on the proposition to have the various local organizations adopt a uniform name, and five such organizations are now known as:—

“The Technology Club of New York.”

“The Technology Club of New Bedford.”

“The Technology Club of the Connecticut Valley.”

“The Technology Club of the Merrimack Valley.”

“The Rocky Mountain Technology Club” (Denver).

The executive committee of the Technology Society of Philadelphia will recommend at the next meeting that the society adopt the name of “The Technology Club of Philadelphia.” The local organizations in Chicago, Cincinnati, Buffalo, Pittsburg, and Washington have not as yet made any change of name, and some of them do not care to do so at this time. It was voted that the Washington Society of the M. I. T. and the North-western Association be represented upon this committee for the ensuing year.

The report of the Special Finance Committee, appointed at the seventh annual meeting to consider methods of raising revenue for the Association, was presented by W. B. Snow, chairman. The

meeting voted unanimously to adopt the report and to request the payment of contributions to the Association in accordance with the following plan, beginning with the year 1904:—

That every fifth year following graduation each class be asked to make payment to the Association on the basis of its living graduates, as follows:—

5 years after graduation, 10 cents for each living graduate.									
10	"	"	"	20	"	"	"	"	"
15	"	"	"	30	"	"	"	"	"
20	"	"	"	40	"	"	"	"	"
25	"	"	"	50	"	"	"	"	"
and every 5 years thereafter,				50	"	"	"	"	"

The Association has never felt that it possessed the authority to levy assessments upon the classes. It has therefore merely requested the payment of certain sums, and these requests have been very generally complied with. Two so-called general assessments have been thus requested during the eight years of the Association's existence.

The report of the Committee on Undergraduate Organization was read by the secretary, in the absence of C. M. Spofford, '93, chairman. In accordance with the vote of the Association on Nov. 19, 1903, a card catalogue of all the undergraduate classes, except 1908, has been prepared on standard cards of the Association, and a suitable cabinet obtained for it. This catalogue will be kept in the Dean's office at the Institute, and will be at the command of the undergraduate secretaries. After a class has graduated, its catalogue will be turned over to the first graduate secretary. The committee recommended that the Dean be requested to send, each year, to all men no longer at the Institute, but whose names are in the catalogue of the graduating class, a request to verify their addresses; and it was suggested that such a request might be accompanied by a brief notice of the graduation exercises.

The Committee on the Technology-Harvard matter reported, through the secretary, the progress of its work to date. In view of the present status of the question of the relations of the Insti-

tute with Harvard College, the committee felt that the need of its existence was not at an end; and it asked to be continued, in order to act, at its discretion, upon conditions as they might arise. It was voted unanimously to continue the committee in office, with full powers. At the request of the committee the following recommendations were adopted by unanimous vote:—

The Association of Class Secretaries respectfully recommends to the Executive Committee of the Alumni Association that, whenever the plan of “combination of effort” of the Institute with Harvard College is referred to the alumni, the Executive Committee seek to carry out the following method of procedure:—

1. That a general meeting of alumni be held for the systematic discussion of the plan presented.
2. That a report of this discussion, in print, be sent to the alumni generally.
3. That, with the report of the general meeting, there be presented to the alumni, if possible, the opinion of the Faculty on the educational issues involved.
4. That thereupon the definite opinion of the alumni upon the proposed plan of combination be obtained by letter ballot.

The report of the Committee on Publication of the TECHNOLOGY REVIEW was presented by J. P. Munroe, '82, and accepted. It was shown that the extraordinary expenses of the present year, together with a decrease in receipts from advertising, had placed the REVIEW in a position far from satisfactory, and that the magazine must begin the new year with some uncertainty as to its future. The greatly increased cost of the REVIEW during the year was due mainly to the reunion number. Not only was that issue of unusual size, but there were various extraordinary expenses in connection with securing and printing the material. Furthermore, by agreement with the Tech Reunion Committee, a copy of this number was sent to every past student of the Institute for whom an adequate address could be found. For that service the Reunion Committee paid \$400, a sum based upon calculations made before the printing of the reunion number. As a matter of fact, however, the extraor-



dinary expenses of this number of the REVIEW, proportioned upon the 3,200 extra copies, were \$795.50. This extra cost, less the \$400 paid by the Reunion Committee, represented within about \$50 the shortage in the year's accounts; and, as it was due to a service rendered to the Alumni Association, and at the request of a committee created by that body, the Association of Class Secretaries voted, unanimously, to request the Alumni Association to reimburse the REVIEW for the sum of \$395.50. The Committee on Publication felt that the Association was to be congratulated upon the increasing attractiveness of the REVIEW, due largely to the efforts of Institute officials and the members of this Association in gathering and sending in news of deep interest to all M. I. T. men. Not only has the volume just ended been 100 pages larger than any previous issue, but it has also contained a larger proportion of live material.

It was voted to amend the By-laws to include in the membership of the Association the Committee on Publication of the TECHNOLOGY REVIEW. The membership of the Association of Class Secretaries now consists of the secretaries of all graduate classes and of all local alumni societies, the president and secretary of the Alumni Association, the president of the Technology Club, the Secretary of the Faculty, the members of the Committee on Publication of the TECHNOLOGY REVIEW, the secretaries of the four undergraduate classes of the Institute, and the president of the Institute Committee.

The subject of co-operation between the TECHNOLOGY REVIEW and the Alumni Association was brought up, and attention called to the fact that a joint committee representing the Alumni Association and the Association of Class Secretaries had been appointed in 1902-03 to consider this matter. Discussion showed that no plan of co-operation yet proposed appeared feasible under present circumstances, and the Class Secretaries' Committee was discharged.

E. G. Thomas, '87, member of the Income Fund Committee, spoke upon the status of the Technology Fund, after which the meeting adjourned.

FREDERIC H. FAY, '93, *Secretary*.

## SPECIAL MEETING, DEC. 2, 1904

A special meeting of the Association of Class Secretaries was held at the Technology Club, Boston, on Friday evening, Dec. 2, 1904, W. B. Snow, '82, being chosen chairman of the meeting.

A letter from the secretary of the M. I. T. Alumni Association was read, stating that the executive committee of the Alumni Association had voted to receive, with thanks for the suggestions, the resolutions passed Nov. 15, 1904, by the Association of Class Secretaries relative to the procedure to be followed when the plan of combination with Harvard is referred to the alumni. A. G. Robbins, '86, secretary of the Alumni Association, and H. S. Chase, '83, member of its executive committee, stated for the information of the meeting that the executive committee had voted to adopt the recommendation, that the plan of procedure was approved by the President of the Institute, and that the President had promised to recommend that the Corporation refer the matter to the Alumni Association to secure the expression of alumni opinion.

H. C. Forbes, '91, then read a paper upon the subject of Education at the Institute, and its Relation to the Proposed Combination with Harvard. Mr. Forbes submits the following abstract of his paper:

The dissension that exists among the alumni should be removed by all uniting upon a common ground. This ground should be the welfare of the Institute,—to uphold and upbuild its reputation and to improve its educational product. The educational conditions of to-day, as they relate to the demand, are: first, the Institute's training is lacking on its general educational and social side; and, second, a new demand is arising for a broader scientific education. Both call for a more liberal and less technical scientific training. If the Institute does not meet modern conditions adequately, its welfare and reputation are threatened. To meet these conditions is no simple problem, and whether it can be solved by the Institute alone better than in alliance with Harvard must be thoroughly investigated.

Charles Garrison, '91, at Mr. Forbes's request, spoke of the opportunities which Harvard might offer to the Institute in case some form of co-operation were effected, as follows:—

First, the opportunity for extensive choice of studies in English and general subjects. The art of thinking and expressing one's thoughts is so closely associated with composition that considerable practice in written work is desirable. Harvard offers some fifty courses in English, thirty in history, twelve in government, twenty-seven in economics, thirty-nine in philosophy, thirty-three in mathematics and astronomy, and corresponding numbers in the classics and natural sciences. With such an array of courses to choose from, does it not seem that the rigid technical education of the Institute might well be supplemented from this list? Second, the reason why students cannot receive as full development at the Institute lies in the fact that the university professors live in surroundings of less pressure and an atmosphere of broader thought. To be associated, directly or indirectly, with such men as Norton, James, Shaler, Goodale, J. M. Peirce, B. O. Peirce, Byerly, Willson, Palmer, and Royce cannot fail to make a lasting impression. Third, to be associated with men pursuing courses other than scientific changes the atmosphere, and gives a sense of relief to the tension to which the Institute student is subjected. Fourth, the Harvard spirit. Apparently, the Harvard spirit needs some explanation to Institute men. The general idea seems to be that the student body consists largely of wealthy society students, steeped in gambling and athletics, and surrounded by an atmosphere of "mediæval classicism." Indeed, it is far from that, and Harvard has progressed rapidly and radically from the conditions existing twenty or thirty years ago. Co-operating with the university life, having such opportunities and advantages for supplementing our specialized courses, being within the influence of an atmosphere of broader thought, and of a spirit it would do no harm to emulate, surely this represents education in its broadest sense.

Mr. Forbes, in continuing his paper, said:—

Who shall assure us that the educational product and the reputation of the Institute cannot be advanced by utilizing, in some way, the educational advantages of Harvard? We are bound by our Tech education to form our own judgment only through calm investigation and just consideration. I feel that the question before us is, What are the factors that we must know before we can form our judgment? We want to know from the Faculty:—

1. By making use of the combined educational advantages of Harvard and Technology, what would be the outline of a course of study which would result in a more liberal scientific education?

2. What would be the outline of such a course worked out with Technology resources alone?

What the Institute needs, to meet the growing demand, in addition to its applied science work: more liberalizing influence, more intermingling among students, more college life, more liberalizing studies tending toward general culture, greater variety of thought. I advocate a course of study to consist of the equivalent of two years' academic work and two years of technological work, to result in the degree of S.B. Following this, an additional year of graduate work to be recommended for the degree of S.M. The time for the additional academic work would come somewhat from an increase of entrance requirements, but mainly from a readjustment of the courses in applied science. The Institute requires an excessive amount of practical work to the exclusion of more profitable matter. I do not see that the standard of work need be affected. It is the Faculty who must work out the problem. Let what I have said serve merely to suggest the opportunity for a readjustment of the Institute's curriculum in the interest of a more liberal education in science. But, until the Faculty has worked out and shown us in detail the different ways in which the demand can be met, our judgment must be suspended. It is not self-evident that the ultimate result of an alliance with Harvard will be the absorption of the Institute. The Institute is more in danger in not fully meeting modern conditions than it is in forming a proper alliance with Harvard and meeting them well. We all desire to uphold and upbuild the Institute's reputation. This will be done by improving the educational product. We have a deep problem before us. How can it best be solved? Shall we say it is not desirable to have any discussion? Or shall we give it just consideration?

Mr. Forbes offered a set of resolutions in line with the arguments advanced in his paper. The resolutions were discussed at length and finally tabled.

In the discussion following the presentation of Mr. Forbes's paper it was shown that the members of the Faculty present welcomed any effort to make instruction more fundamental and more liberal, and that there was no question of the purpose of the Faculty to maintain general studies as an essential part of the Institute's curriculum; but they were strongly of the opinion that no gain in this direction would result from a combination with the university. Moreover, it was impossible to identify Mr. Forbes's idea with the as yet unknown plan to be presented to the Corporation.

From the foundation of the Institute the Faculty has sought to broaden and deepen the education which it gives, although at times it has been hampered by lack of funds. In the professional work of the departments, too, the Faculty is ever alert to discover means of improvement. The Institute is by no means standing still. She is constantly advancing, and she has made notable progress since our student days. Alumni, even of recent years, may not realize the extent of gradual improvement, and they should not criticise the school from memories of their experiences as undergraduates.

As to the advantages to be gained from instruction in literary subjects at Harvard, it was the opinion of members of the Faculty most competent to speak with impartial authority that these supposed advantages had been greatly overstated. It was recognized that courses of great value are offered at Harvard, but it is a question what advantage Institute students could draw from them, even if part of the Institute work were put over to a graduate year. Most of the Harvard courses cited by Mr. Garrison as being particularly valuable to Institute students are advanced courses, and can be taken only by students who have had extensive preparation in the work of the earlier years of the college course. At Harvard the men of the lower classes get very little personal contact with the abler men of the Harvard Faculty. The chief difficulty is not that the Institute does not offer these advantages, but that the students will not make use of those that are offered. It was pointed out that a graduate of the Institute, going to Harvard, as Mr. Garrison had done, already trained to hard work, would have a point of view quite different from that of the college undergraduate, and would be enabled to derive more benefit in a given time.

It was further brought out that Institute work in general studies is of exceptional quality. In such fundamental literary subjects as English composition, political economy, and history, for example, the courses at the Institute are taught quite as thoroughly and the average student comes into personal relations with teachers of a higher grade than in the corresponding courses at Harvard. Because the spirit of work at the Institute is that of interest, thoroughness,

and earnestness of purpose, while such a spirit is not fostered by the elective system of Harvard, the Technology students, especially of the first two years, are further advanced in these subjects than the corresponding classes at Harvard.

In teaching the important subject of English composition, there has recently been developed at the Institute a unique system superior to that of any other college or technical school in the country. Its superiority is so evident and so well proven that already it is being copied by other institutions. The Technology student of to-day surely has very little to gain from association with the university in the matter of being able to speak and write correctly.

Discussion of the social side of the student life at the Institute showed that the Technology spirit is one of strong and wholesome democracy. At the Institute to-day the students intermingle in most democratic gatherings, such as are rarely to be found in college life generally. A notable example was the dinner following the recent Sophomore-Freshman Field Day, at which all of the contestants of the two classes dined together in a spirit of most cordial good will. The development of athletics is taking place along more advantageous lines than at most colleges, the participation of a greater proportion of the students being secured. The Tech Union, class meetings, departmental and general societies and fraternities, are all doing excellent work in bringing the students together socially, and in this direction a great deal is being done at the Institute that is without precedent in other colleges.

One of the important reasons for the Institute's success lies in the fact that from the beginning the members of the Faculty have worked together most harmoniously, each member planning his own particular work with reference, always, to the work and the needs of the others. This is particularly important in the adaptation of instruction in general studies to the special needs and points of view of technological students. Such "team work" on the part of the Faculty would cease to exist if a part of the studies were to be given by professors of another institution.

It was further urged that the tendency of dependence on the college for general studies would be to diminish rather than increase

the student interest in them, and to make the Institute, sooner or later, a mere graduate school. The advantages of association with students of literary training are already secured to a considerable extent by the attendance of graduates of other colleges.

The Technology Fund was then discussed at length by Everett Morss, '85, chairman of the Income Fund Committee, and by members of the Association. It was explained that the present attitude of the Technology Fund Committee, as repeatedly expressed, is that the plan of combination with Harvard can be more surely settled on purely educational grounds if it is shown that the Institute is not compelled to seek combination because of poverty.

Adjourned. Attendance, thirty-one members and ten guests.

FREDERIC H. FAY, *Secretary*.

#### TECHNOLOGY CLUB OF NEW YORK

On November 10th, Professor W. H. Burr, of Columbia University, and member of the Panama Canal Commission, gave us an interesting and instructive address about the Panama Canal, its early history, the present condition, and its future. There were about one hundred men present. Every one enjoyed the evening.

The theatre party on the 15th of November consisted of fifteen fellows. After a very enjoyable dinner at the club the party attended "Cingalee" at Daly's Theatre.

The first dance and reception given by the club occurred on the 20th of November at the ball-room of the Architectural League on 57th Street. It was a big success in every way, and those present considered themselves very fortunate. It is hoped many more such occasions may occur.

The smoker and debate on the 30th of November was very interesting, and every one enjoyed it.

We had President Pritchett as our guest on Saturday evening, the 10th of December. Invitations for the evening were sent, not only to the club members in the city, but to all alumni and former students of the Institute residing in Greater New York. The num-

ber of men present taxed the capacity of the club,—a fact which shows the great interest the New York Technology men take in the present merger question. The President told of the history of the movement for the alliance with Harvard University, and presented the subject in a clear and concise manner.

John R. Freeman addressed the meeting upon the subject of the merger question, and presented the views from the standpoint of a Member of the Corporation and Alumnus of the Institute. There were speeches for and against the merger question by various members of the club.

The feeling prevailing at the end of the meeting was that the meeting had been a success in every way.

The club entertained the alumni of Syracuse University on Monday evening, the 19th of December. There were fully forty Syracuse men present. A thoroughly good time was enjoyed, not only by the club members, but by the Syracuse men.

C. R. PLACE, '02, *Secretary*,  
36 East 28th Street, New York, N.Y.

#### WASHINGTON SOCIETY OF THE M. I. T.

This society has inaugurated a new scheme, and that is to hold informal smokers on the second and fourth Mondays of every month at the University Club. An excellent dinner at a price to suit a modest pocket-book is served at six o'clock, and afterwards the many privileges of the club are enjoyed. Visiting Institute men are urged to drop around to dinner and spend the evening with us on these "Technology Nights." Mr. William B. Allbright, '78, of Chicago, honored us with his presence at our third smoker, November 28. The success of these regular meetings has been gratifying. On December 12 the society celebrated the sixth anniversary of its organization with a special dinner. There was much regret that the man who has devoted so much time and energy to the welfare and upbuilding of this society, Mr. Proctor L. Dougherty, refused to upset precedent by accepting a third term as president. He will be succeeded by the promotion of our former vice-president,



Winthrop Cole, '87. The other officers chosen were: William J. Rich, '84, for vice-president; Marshall O. Leighton, '96, secretary; Albert S. Merrill, '00, treasurer; and Frederick W. Swanton, '90, director.

ALBERT S. MERRILL, '00, *Secretary*,  
Bureau of Standards.

#### ROCKY MOUNTAIN TECHNOLOGY CLUB

The latest news of interest to the Tech men may be that a meeting of the Rocky Mountain Technology Club was held at the University Club on Saturday evening, November 26. The meeting was very informal, but considerable interest was shown in the recent literature received from the Fund Committee and other correspondence pertaining to the Technology-Harvard question. The general opinion expressed seemed to be in opposition to any combination by which the independence of the Tech would be in any way impaired. We note that reports are soon to be submitted from the committees on this question, and we shall be very glad to receive advices concerning the conclusions reached. It is rather difficult to get personal notes from the various men on account of their being so widely scattered; and so, unfortunately, I cannot send you any items at this time.

We heard many interesting expressions of pleasure at the great success of the reunion, and many of us regret so much that we were not able to be present.

Members of the class of '87 are grateful for the beautiful tribute given Fred Field Bullard in the last number of the REVIEW.

FRANK E. SHEPARD, '87, *Secretary*,  
30th and Blake Streets, Denver, Col.

#### PITTSBURG ALUMNI ASSOCIATION, M. I. T.

At a meeting of the Pittsburg Alumni Association, M. I. T., the following officers were elected for the ensuing year: C. A. McClure, '94, president; S. B. Ely, '92, vice-president; R. H. Danforth, '98,

secretary and treasurer; executive committee, F. E. Alden, E. H. Dewsens, '85, F. A. McDonald, F. E. Field, '96, H. D. Shute, '92.

R. H. DANFORTH, '98, *Secretary*,  
Wilkinsburg, Pa.

#### THE TECHNOLOGY CLUB

The ninth season of the club began with the annual meeting, which was held on October 13. The regular reports of the officers were read. The secretary's report shows a loss of thirty-two members. This is considered a very small loss in view of the recent increase made in the dues, from fifteen to twenty dollars per annum. The treasurer's report shows a most wholesome state of affairs. For the first time in the history of the club there is a financial gain. Before the report of the nominating committee was read, Mr. Munroe spoke of his eight years of service as president, and stated that, as the club was now out of any financial embarrassment, he felt that he was privileged to resign. The report of the nominating committee was made, and by the usual ballot the following officers were elected for the ensuing year: Guy Lowell, '94, president; Francis H. Williams, '73, vice-president; Walter Humphreys, '97, secretary; Seth K. Humphrey, '97, treasurer; William W. Crosby, '93, John O. DeWolf, '90, George O. Draper, '87, Frank G. Stantial, '79, Robert S. Weston, '94, members of the council for three years. Mr. Munroe thereupon introduced the new president to the club.

Mr. E. C. Miller, '79, spoke on behalf of the members of the club, and announced that they had decided to place on the walls of the club a portrait of the first president who so successfully founded and has for eight years unselfishly and devotedly served the Technology Club.

The business meeting adjourned, and the former president introduced Mr. Linwood O. Towne of the class of '78, who gave an interesting talk on Nova Scotia, illustrated by the stereopticon.

WALTER HUMPHREYS, *Secretary*,  
83 Newbury Street, Boston.

## NEWS FROM THE CLASSES

1868.

PROF. ROBERT H. RICHARDS, *Sec.*, Mass. Inst. of Tech., Boston.

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Ellery C. Appleton has been for some time on the Missouri Pacific, with headquarters at Antoine, Ark. His family, consisting of his mother, his wife, and six children, who have been staying at Westboro, Mass., have recently joined him.—Whitney Conant and his wife are spending the winter at Hotel Regent, 70th Street and Broadway, New York City.—At the annual meeting of the alumni, December 23, the class was represented by Forbes, Tolman, Stevens, and Richards.—At the celebration of the one hundredth birthday of President Rogers the "Beginnings of the Institute" were recounted by Robert H. Richards.—William E. Hoyt visited Boston in October to see his son started in school.—The class of '68 has so far contributed \$14,000 to the Tech fund.

1874.

CHARLES F. READ, *Sec.*, Old State House, Boston.

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William B. Dowse has again become a resident of Boston, after being in business in New York City for many years.—William T. Blunt, accompanied by his wife, made a visit to Boston and vicinity recently. He received a hearty welcome from his former classmates, a few of whom met him at an impromptu lunch.—William Batchelder Greene died in Boston, Sept. 14, 1904, in the fifty-fourth year of his age. Mr. Greene, who had lived for many years in England and France, was never engaged in business.—Benjamin L. Crosby, who has resided for some years in St. Joseph, Mo., has removed to Tacoma, Wash., where he is engaged with the Northern Pacific Railway Company.—George B. Elliot is receiving the sympathy of his former classmates in the recent death of his wife in

Jamaica Plain, Mass.—Willis R. Russ, Charles C. R. Fish, Albert C. Warren, and William P. Robinson have recently been elected associate members of the Alumni Association, M. I. T.

1877.

RICHARD A. HALE, *Sec.*, Lawrence, Mass.

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During a short trip to Saratoga on professional work the secretary called on J. Marshall Colcord, a former member of '77, who has been located at this town for about twenty-four years. He is the principal druggist of the town, has an excellent location, and is very pleasantly situated with his family in the residential part of Saratoga.—E. G. Cowdery, formerly of the Milwaukee Gas Company, is now located at St. Louis as manager of the Laclede Gas Light Company, which is a consolidation of the various gas light companies in the city. Mr. Cowdery is a recognized authority on matters connected with the manufacture of gas and kindred subjects.—W. L. Hallette, who has not been heard from for many years, has written, and is now located at the Washoe Copper Company's sampling works at Butte City, Mont.—The New Hampshire court has recently appointed a commission, consisting of R. A. Hale, C.E., and Freeman C. Coffin, C.E., who have been holding hearings in Hinsdale, N.H., on matters involving the water rights of various parties on the Ashuelot River.—Arthur G. Everett has resigned from the Board of Trustees of Pauper Institutions of the City of Boston, which he has held for many years. He still takes an active part in connection with the revision of the building laws of the city of Boston.

1879.

HARRY H. CAMPBELL, *Sec.*, Steelton, Pa.

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On the evening of December 17 the class of '79 held their twenty-fifth annual class dinner. The event, which closed a quarter-century of continued class spirit, took place at the new Hotel Astor in

New York City. Though a very stormy night, yet nine of the boys were present, including Miller, our class president, Campbell, our class secretary, who came on from Western Pennsylvania, Haskins, Fellows, Blake, Jenks, Macfarlane, Large, and Waitt. The dinner was preceded by a social half-hour, in which pleasant reminiscences, pointed stories, and good jokes helped to whet the appetites which were, even without the sharpening, in excellent working order. Dinner was served in a charming room, fitted up, even to minor details, to represent the cabin of a large steam yacht. An especially pleasing occurrence was the presentation by President Miller, on behalf of the class, to Harry H. Campbell, our class secretary for twenty-five years, of a handsome bronze female figure, representing "The Future," as a token of esteem and appreciation from the boys of '79. New officers for 1905 were elected, Waitt being chosen president, and Campbell secretary.

1881.

FRANK E. CAME, *Sec.*, 17 Place d'Armes Hill, Montreal, Que.

Warren writes, "I have returned safely from the Yellowstone Park, and the bears did not eat me up, as I hear they nearly did several people since I got home."—Henry N. Sweet has gone with Hornblower & Weeks, bankers. The junior member of this firm was recently elected to Congress.—Harry Cutler writes, "I am pleased to say that I am now vice-president of a million-dollar corporation instead of the president of a fifty-thousand-dollar corporation, as I was in 1898."—Noble writes from Anaconda, "There are no births in my family, as I am still an old bachelor."—Frank Dort is travelling salesman for Henry K. Wampole, of Philadelphia.—Stearn writes: "Have a boy nine years old and a girl five years old. Parents both alive. Glad to see any of the class at Montreal."—Jim Lund is managing chemist of the West Department of Cochrane Chemical Company, and has been developing the technical side of the business.—Frank Darlington is "still getting well, and the doctor says it will take me five years more."

Ira Abbott is with Post & McCord, New York.—Lyman Gerry is in the engineering department of the Massachusetts Highway Commission, and has been located at Fitchburg recently.—John Allen is now in Russia, and will not be back to the United States for some time.—Maxcy writes from Philadelphia: "I have not met a member of the class since 1883, when I ran across Came, and suppose I am not the only one who is scratching gray hairs and finding kinks in rheumatic-afflicted corners. This getting old is a funny sensation, since the body grows old with the mind remaining young."—Rogers is at Canton, Mass.—Darlington spent the summer at Hyannisport, Mass.—Barnes has gone to Costa Rica for a year or two, superintending the installation of a water and sewerage system for the city of San José.

1882.

WALTER B. SNOW, *Sec.*, 29 Russell Avenue, Watertown, Mass.

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An informal gathering at the Technology Club on the evening of November 21 was attended by Cheney, French, Gooding, Hall, Herrick, Manning, Munroe, and W. B. Snow.—Manning's recent address has been 194 Maple Street, Lynn, Mass.—Deering spent the fall months in Europe. His business address, as vice-president of the International Harvester Company of America, has been changed to 7 Monroe Street, Chicago, Ill.—Hall has moved from Peterboro, N.H., to Winchendon, Mass.—Munroe has been re-elected president of the Massachusetts Reform Club.

1884.

PROF. WILLIAM L. PUFFER, *Sec.*, Mass. Inst. of Tech., Boston.

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Classmate Park spent a few days in Boston renewing old acquaintances while on his return journey from a business engagement, which took him through many of the mines of Mexico, Central America, and South America. He has returned to his home in California, where he expects to remain.—The total subscription of the

class of '84 towards the Technology Fund is at present only \$498; and it is hoped that the members of the class who have not come forward in this good work will communicate immediately with the class secretary or the local committee, from whom they have probably received correspondence.

1885.

I. W. LITCHFIELD, *Sec.*, 161 Devonshire Street, Boston, Mass.

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It has leaked out that President Richards came to Boston surreptitiously about two months ago under sealed orders from himself, and much mystery is connected with the visit. It is understood, however, that it has something to do with the twentieth anniversary of the class of '85, about the middle of next June. Rumor says that this celebration will be more glorious and soul-permeating than anything on the criminal court docket for several years. Every '85 man on this continent at least is expected to participate. Automobiles will be sent for those beyond walking distance. Watch for announcement in the *Hustler*.—Dave Baker was in Boston recently, and met a few '85 men at luncheon. He comes every month or two on business connected with the Massachusetts Steel Casting Company of Everett, Mass., of which he is president. He is located in the Real Estate Trust Building, Philadelphia, doing consulting metallurgical work.—Ed. Dewson was in town this summer, according to hearsay, testing the brakes on the Boston Elevated Railway. He has paid his subscription to the *Hustler*.—Chief Engineer R. H. Pierce has returned from his station at the World's Fair, and is now plain "Dick" at the same old stand, with office hours from 12 to 1.—The Christmas *Hustler* is being held back, awaiting a half-page advertisement from Thomas Lawson, '85. It is understood that it will boom Colonel S. Cuyler Greene's copper interests. "Now is the time to subscribe."

1887.

EDWARD G. THOMAS, *Sec.*, 1269 Broadway, New York, N.Y.

Morton Cobb, accompanied by Mrs. Cobb, left December 14, for an extended trip to the mines of the Boston Mines Company in the western part of Costa Rica. Mr. Cobb is manager of this property, which consists of an operating gold mine extensively developed and equipped.—Giles Taintor, as counsel, was in charge of the case of the Institute in the investigation before the Police Commissioners of the recent affair between the students and the police on the night of the Republican Torchlight Parade on November 2, in which so many students were brutally clubbed. E. G. Thomas and Harry S. Adams rendered valuable assistance in expert work on photographs and plans used in the investigation.—The Secretary has accepted the position of manager of the New York department of the Lamson Consolidated Store Service Company, and requests all his friends to call upon him at 1269 Broadway. The Lamson Company, in addition to the extension of its store service, cash, and parcel systems, is developing pneumatic and cable carriers systems for the distribution of mail orders, and any form of printed matter in offices, factories, etc.; and these devices will include sizes capable of moving small packages.—Gelett Burgess has added two new books to his list of publications this year, "Goop Tales, a Study of the Behavior of Fifty-two Interesting Individuals, who, though Mainly Virtuous, has Each One Human and Redeeming Fault," is the third of his Goop series, and, as a manual of manners for children, is somewhat more carefully planned on psychological lines. The illustrations are in Mr. Burgess's usual grotesque style, and are called by him "gargarisms." "The Rubaiyat of Omar Cayenne," also issued by the Stokes Company as a booklet, is a close parody of Fitzgerald, not only in form, but in spirit, and is a somewhat audacious satire on modern literature and art, containing several humorously autobiographical quatrains. "The Maxims of Methuselah," promised by Mr. Burgess for this year, was withdrawn from publication after it had gone to the printer. Houghton & Mifflin will bring out



a book of Burgess's essays next spring under the title "The Rationale of the Perverse," being an extension of the somewhat fanciful philosophy exploited in his "Romance of the Commonplace," published several years ago.—Oren S. Hussey has returned to his old love, the manufacture of electrical material, and is now vice-president of the Frank Ridlon Company, 200 Summer Street, Boston, who deal in and manufacture electric light and railway supplies. This company pays especial attention to the rewinding of armatures and fields and other repairs to electrical machinery. Hussey has moved to Boston for the winter.—All who have had the great pleasure of acquaintance with Gilbert W. Morrison will learn with great regret of his death, the result of an accident at Englewood Station in Chicago on the Illinois Central Railroad. In attempting to board a moving train, he slipped, was thrown heavily, and was picked up unconscious, and died from internal injuries received. The accident took place on Monday evening, December 26, and his death occurred the next morning at the Englewood Union Hospital. Morrison was born in Chicago in 1862 or 1863. His family shortly afterwards removed to Exeter, N.H., where he was educated in the public schools, graduating from the Exeter High School in 1880. He showed marked ability in his school life, and, having a natural aptitude for mechanics, entered the employ of the Exeter Machine Works as an apprentice immediately after graduating from the high school. He soon worked his way up, and became an expert journeyman and mechanic. He was entirely dependent upon his own resources, and, having placed himself in a sufficient position to warrant his proceeding further with his education, took a course at the Institute of Technology in Mechanical Engineering with the class of 1887. On leaving the Institute, he was employed by the John Russell Manufacturing Company of Turner Falls, Mass., for whom he worked two or three years, then entered the employ of the Loomis Manufacturing Company, and was sent by them to Holland and Belgium to superintend the installation of water-gas machines. On returning to this country, he continued in their employ, and at the time of his death was stationed at the main works of the Loomis-Pettibone Gas Machinery Company of Milwaukee, Wis., as super-

intendent of the setting-up department of this company. He had in charge all the men that were sent out throughout the country to install machinery, and carried upon him the responsibility for the successful starting of the company's plants. This position was a lucrative and important one, and he had a bright future before him in every way. He was unmarried. Morrison was a man of the very highest moral character, of pleasing personality and marked ability.

1888.

WILLIAM G. SNOW, *Sec.*, N.W. Cor. Broad and Wallace Sts.,  
Philadelphia, Pa.

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Everett S. Jones, formerly of Spencer, Mass., is now an instructor in the Jacob Tome Institute, Port Deposit, Md.—The secretary's business address has been changed from 245 No. Broad Street to the one stated above.—Sumner B. Merrick is president of the Meadow River Coal Company and the Meadow River Railroad Company of West Virginia. The line is now being built, and will be forty-six miles in length. Merrick has recently made his headquarters at the Technology Club of New York.—The following is from the *Engineering Record* of Dec. 3, 1904:—

The report of Messrs. Stone & Webster on the varied assortment of power plants in the navy yards of the country has a flavor of "Pinafore" about it, at least to those outside the Navy Department. It is a strictly sober document, of course; but the contents reveal such an absurd situation that the reader will be amused until he reflects that the joke is on the people of the United States, so to speak, for it is they who bear the expense of this ridiculous condition. Those who desire a detailed statement of the jumble of power plants in each yard will find it in the full document, which is too long to be reprinted here. The situation may be summed up very briefly in the statement that there are two to four power plants of comparatively small size in each yard, run under entirely independent direction, and so operated that they are far less economical than a central station for all services would be. This last assertion is based on the assumption that the central station is as well managed as an ordinary commercial station.

The cause of this condition has doubtless been apparent to Mr. Morton since he took hold of the affairs of the Department. Anybody who has won his way to the position in a great railway organization which Mr. Morton resigned to join the cabinet does not need a sign-post to attract his attention to a serious muddle of the various bureaus under him. He has probably recognized the sound reason for the familiar Washington saying that American naval officers are such good fighters because they are everlastingly at it among themselves during times of peace.

B. R. T. Collins represented Stone & Webster in making the investigations of the steam power plants in the several navy yards. The secretary was pleased to receive a call from him when he was in Philadelphia examining the League Island Navy Yard.—Russell Robb became a partner in the firm of Stone & Webster on January 1.—Clarence B. Vorce is with the John F. Kelly Engineering Company, New York.

1889.

PROF. F. A. LAWS, *Sec.*, Mass. Inst. of Technology, Boston.

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At the reunion in June there were many inquiries concerning Basford. The members of the class will therefore be pleased to know that his trip abroad proved most interesting and enjoyable. He was given exceptional facilities for studying railroad problems, and his observations concerning what should be accomplished by technical schools along certain lines are of moment. He says:—

Many European travellers who have studied railroad operation, particularly in France, Germany, and England, have returned to tell us that we have nothing to learn from these countries. It was my privilege to spend some weeks last year in studying foreign railways, and my impression is that we have a great deal to learn. However, perhaps not as much as foreigners need to learn from us. The European railways have developed slowly and in a manner characteristically different from the fierce advancement of the railway problem in this country. With us railroads have developed the country, and have advanced westward ahead of civilization. This makes a vast difference in the problems themselves and in the manner of approaching them. What we need most to learn is thoroughness and the necessity

for far-sightedness in providing for the future. This applies not alone to material, but to *personnel*. Foreigners have in some cases built too well, and are now hampered by permanent structures of such expensive character that they cannot easily be changed to suit conditions which have entirely changed since they were put into service. We have not made that mistake, but, as American construction is gradually made of more permanent character, we should see to it that sufficient provision is made for expansion, so that we do not find ourselves some years hence with very expensive railroad construction which is inadequate for the requirements, and is still too expensive to change. In the matter of *personnel* American railways need some of the steadiness of the English roads, particularly with reference to managing the locomotive department. On English railways the chief of the motive power department is recognized as an exceedingly important official, and it is well worth while for the best mechanical talent to prepare for filling this important position. The compensation and standing of the officers is such as to attract the best mechanical men; and, when once well in line for promotion, they are very seldom attracted away into other lines of activity. It is not so in our country. Inasmuch as motive power talent is greatly needed here at the present time, one of the greatest lessons we have to learn from foreigners is how to deal with motive power problems in such a way as to secure permanently the services of the ablest mechanical men; and the service should be made so attractive that they cannot be enticed into other lines. This means a great deal to young men who are graduating from technical schools, and it means much to the railroads.

—Cilley is devoting himself to the study of advanced problems in bridge design, and has published a number of papers on the subject, one of which appeared in the August number of the *Proceedings of the American Society, Civil Engineers*, bearing the rather formidable title, "General Methods for the Calculations of Designs for the Manhattan Bridge and the Blackwell's Island Bridge, New York." This was written last fall, and would have been published in February, had it not been held back for publication with some other papers. The work to which it refers, the making of independent or check calculations of stresses for the bridge department in New York for the two proposed big bridges across the East River, was all done last year, being completed in December. Since then he has been busy with a suspension bridge theory, upon which he has

been working for three years. This is a work of considerable magnitude, and its completion will require a year or two.—G. C. Whipple has recently resigned his position as biologist in the Department of Water Supply, Gas, and Electricity of New York City, and formed a partnership with Mr. Allen Hazen, the well-known hydraulic and sanitary engineer, under the name of Hazen & Whipple, St. Paul Building, New York City. Whipple had been director of the Mount Prospect Laboratory in Brooklyn for seven years, and had seen it developed into the foremost laboratory of its kind in America. During the year 1903, in addition to his regular duties, he served as engineer of the Department of Chemistry and Biology of the Committee on Additional Water Supply of New York City, and prepared a lengthy report on the quality of the various streams in Eastern New York available as sources of supply for New York City. During the past year he was also one of the experts who testified in the famous Chicago Drainage Canal case, now being tried before the United States Supreme Court. Other recent investigations of his have been a study of the typhoid fever epidemic in the Kennebec Valley, a study of the pollution of Lake Champlain by the paper mills near Ausable, an investigation of the water supply of Cleveland with respect to its need of filtration, and a sanitary survey of the Rockaway River, which furnishes water for the city of New Jersey. The firm has many consulting engagements in various cities in connection with filtration plants and with matters pertaining to public water supplies and sewage disposal systems, one of the most important being a consideration of the question of the filtration of the entire Croton water supply of New York City. Whipple also holds the position of consulting professor of sanitary engineering in the Brooklyn Polytechnic Institute, and is soon to give a course of public lectures on Water Purification and Sewage Disposal. Not long ago he was elected a Fellow of the Royal Microscopical Society of London.—Pike states that his firm has just completed the electrical equipment of a great suburban estate for Percival Roberts, Jr., formerly president of the American Bridge Company and Pencoyd Iron Works, which, on account of its size and the extent of electrical equipment, is of more than usual

interest. "This estate is laid out upon the lines of an English ducal estate, and covers a space of about six hundred acres, about ten miles from Philadelphia, with a splendid mansion, designed, by the way, by Boston architects, Peabody & Stearns, the landscape work being done by Olmsted Brothers. At one corner of the estate a small river allows the production of water power. We have designed a dam, and installed a water wheel, with auxiliary gasoline engine driving two generators. A large storage battery takes care of the load during night. The power is transmitted about a mile overhead, and then is distributed around the various buildings on the estate by means of underground cables. Quite an extensive telephone system connects all the buildings. A considerable amount of power is to be used in the stable, farm buildings, and dairy. The lighting of the buildings and along driveways and gardens is naturally quite extensive. We have also about completed the installation at the new Pennsylvania State Capitol, a magnificent building, to cost about six million dollars. Our contract covers the entire electrical equipment, about 1,200 kilowatts in generating units, and a very large telephone system and extensive call systems, and will also probably be extended to cover the decorative lighting on the exterior. We have quite recently purchased a building, and, after having altered it to suit our needs, are now occupying it with great satisfaction and marked increase in our facilities for carrying on our business"—Hobart has published through the Macmillan Company a treatise on "The Electric Motor, Continuous Current Motors, and Induction Motors, their Theory and Construction." This is a work of some four hundred and fifty pages. The various points dealt with are illustrated by many curves and diagrams and by detailed calculations of special cases. The book is primarily for the use of those who are experts in the design of electrical machinery, and discusses the most advanced problems concerning the electric motor.—Kilham states that his firm has had a good year's work. Among the buildings handled during the past year were the large houses at 478 Commonwealth Avenue and 896 Beacon Street in Boston, two eight-room grammar school buildings at Beverly and Marblehead, ten or a dozen residences in various localities around

Boston, a fire station, and a large number of alterations. His firm has now under way sketches for a large amount of commercial work, such as business blocks and the like. The increase of business has necessitated the remodelling of the firm's offices. This has been completed, and the result proved to be most satisfactory. Kilham presents Walter H. Kilham, Jr.

1890.

GEORGE L. GILMORE, *Sec.*, Lexington, Mass.

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Charles Hayden has been elected to the board of directors of the Shannon Copper Mining Company, and is one of the executive committee.—Rev. George Francis Weld and Miss Dorothy Everard Appleton were married December 8. The bridegroom was a member of the class during the Freshman year, and will probably be best remembered as the president of "The Society of Ninety" that flourished in our early years at Tech. Weld is now rector of the Episcopal Church of St. John the Evangelist at Hingham.—Schuyler Schieffelin is now at 170 Williams Street, New York, with Schieffelin & Co.—"Gardner T. Voorhees, formerly of Boston, filed suit to-day against the Louisiana Purchase Company for \$25,000 for alleged breach of contract. He claims that he was made chief of refrigeration of the World's Fair on Dec. 31, 1902, that in a short time the title was conferred upon another, and he was told his services were not needed. He claims he is a prominent engineer, and that by not being allowed to cool the fair he has lost prestige and reputation in his profession."—*From the Boston Herald, Nov. 23, 1904.*

1892.

PROF. WILLIAM A. JOHNSTON, *Sec.*, Mass. Inst. of Tech., Boston.

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Cards have been received announcing the marriage of Murray Warner to Gertrude Bass Fiske on Saturday, Oct. 1, 1904, at Shanghai, China. "Murray" certainly has the best wishes of all members of the class. Mr. and Mrs. Murray Warner at home after

November 1 at 133 Range Road, Shanghai.—Severance Burrage writes:—

I might say that during the past summer I was engaged at St. Louis by the Exposition authorities as superintendent of the Hygiene Section in the Educational Building at the World's Fair. I am still retaining the position, and shall continue to do so until all the exhibits are packed and shipped home. I still hold the same position at Purdue University (assistant professor, sanitary science), which I have now occupied over nine years. The school here is enjoying unusual prosperity, and is growing very rapidly. It is a matter of great regret to me that, owing to my work at St. Louis, I was unable to get East for the grand Alumni Reunion last June.

—Leonard Metcalf has been engaged in some professional work in Costa Rica, Central America. He returned to Boston about the middle of December, having been away about two months.—It is with sincere regret that I have to announce the death of Macy Stanton Pope, a very highly esteemed member of the class of '92. Graduating in the Department of Civil Engineering, he served the Institute as an instructor in that department. Afterward he joined the Factory Mutual Fire Insurance Company as an inspector, which position he held at his death. He was in poor health for about six weeks preceding his death, which occurred on Saturday, Dec. 10, 1904. Funeral services were held at the house of Mr. Charles F. Cutter, 822 Beacon Street, Sunday, December 11, at 3 P.M.—The firm of Newman & Harris, architects, Philadelphia, Pa., of which Frank E. Newman is a member, was awarded a prize of \$1,000 for competitive designs for the buildings of the Carnegie Technical Schools of Pittsburg. Their design was ranked fifth among forty-four competitors, most of whom are the best architects in the country. The buildings are to cover an area of ten acres on a site thirty-two acres in extent. The awards were made by Professor Warren P. Laird, of the University of Pennsylvania.



1893.

FREDERIC H. FAY, *Sec.*, 60 City Hall, Boston.

The first informal class meeting and dinner of the season was held at the University Club, Boston, on Saturday evening, Oct. 8, 1904, for the purpose of discussing the Technology Fund movement and appointing a committee to take up the work of soliciting subscriptions from the class. Everett Morss, '85, chairman of the Income Fund Committee, and I. W. Litchfield, '85, former president of the North-western Association, were our guests, and both spoke at length upon the objects of the fund and the needs of the Institute. The evening was spent in a most interesting and full discussion of the subject, in which all present participated. The following Class Committee was appointed: Biscoe, Blood, Crosby, Dawes, Fay, Glidden, Morss, Pickert, C. W. Sawyer, and Spofford. The attendance was eighteen, and, in addition to Messrs. Morss and Litchfield, included Bemis, Biscoe, Blood, S. A. Breed, W. W. Carter, Crosby, Dawes, Fay, Glidden, A. L. Kendall, H. A. Morss, Reynolds, C. W. Sawyer, Spofford, Taintor, and Thorndike ('94). The class subscription to the Technology Fund had reached, by the middle of December, about \$13,000 (\$2,600 per year) from between fifty and sixty subscribers. As at least double that number of members are yet to be heard from, the final amount of the '93 contribution should reach a substantial sum.—At the annual dinner of the Alumni Association, December 23, the following '93 men were present: Bemis, Blood, W. A. Clapp, Crosby, Dawes, Dodge, Fay, D. D. Jackson, Latham, Spofford, and Taintor.—The Chattanooga Powder Company, of which Frank L. Connable, of Chattanooga, Tenn., was vice-president, has been sold to the E. I. du Pont de Nemours Powder Company, of Wilmington, Del. Connable is associated with the latter company, and has taken up his residence at Wilmington.—Carleton E. Davis, who has been located for the past few years at Newark, N. J., as resident engineer of water-works construction, has gone to Panama as engineer of water-works and sewers under the Isthmian Canal Commission. It is reported

that he is to develop water-works and sewerage systems for the cities of Panama and Colon. His address is in care of the Isthmian Canal Commission, Ancon, Canal Zone, Panama.—Announcement is made of the arrival recently of a daughter, Grace Thornton Emery, in the family of James A. Emery, of Birmingham, Ala.—It was reported in December that Arthur Farwell is at work collecting the Mexican and Indian folk-songs of the South-west. He was sent there by the Archæological Institute of America, and is transcribing many of the songs from phonographic records owned by Mr. Lummis, who obtained them while on trips to the Mexican towns and Indian tribes.—The following appeared as an item of Boston news in the New York *Herald* of December 10: "The Rev. Frederick W. Fitts, assistant rector of St. Stephen's Church (Boston), received a letter this morning calling him to Christ Church Cathedral at St. Louis as first canon. Mr. Fitts will give his answer in a few days."—A daughter, Madeleine Austin Howe, came Nov. 3, 1904, to the family of J. Wilder Howe, of New Haven, Conn.—F. B. Kendall, counsellor-at-law, has moved his offices to rooms 1006-1009 Kimball Building, 18 Tremont Street, Boston.—Ervin Kenison is secretary-treasurer of the new Instructors' Club of the Institute, recently formed to promote good fellowship and more intimate relations among the members of the instructing staff.—Upon concluding an engineering engagement in Toledo, where for some months he had been connected with a piece of sewer construction, W. T. Knowlton returned to Boston in November for a short visit prior to making a trip to the Far West. Knowlton's permanent address is 60 Cedar Street, Malden, Mass.—Henry A. Morss has been critically ill of typhoid fever since early in November at his home, 323 Marlboro Street, Boston. At New Year's his condition was still serious, but he appeared to be slowly gaining. Certainly he has the sincere wishes of a host of friends for his speedy recovery.—Arthur S. Pevear announces the removal of his insurance office to 30 Kilby Street, Boston.—Arthur A. Shurtleff, for several years with Olmsted Brothers, landscape architects, of Brookline, and also instructor in landscape architecture at Harvard College, has opened an office for private practice at 22 Congress Street, Boston.—

Elwyn W. Stebbins has opened an office as mining engineer at 4 Nevada Block, San Francisco, Cal. For several years after leaving the Institute Stebbins was connected with the engineering staff of the Southern Pacific Railroad in California, Arizona, and New Mexico. Being desirous of entering the mining field, he took a year and a half at the University of California, and graduated from its mining college in 1901. Since then he has been engaged in practical mining work, principally in Colorado.—Walter I. Swanton and Miss Lucy Cerise Ross, daughter of Mrs. L. deB. Ross, of St. Louis, were married at the Church of the Divine Humanity, St. Louis, Oct. 20, 1904. Mr. and Mrs. Swanton reside in Washington, D.C., where he has a position in the office of the Supervising Architect of the Treasury Department.—On December 17 a daughter was born to Mrs. Kilburn Smith Sweet, widow of our classmate, whose death in July was announced in the October number of the REVIEW. Mrs. Sweet and her mother are living at Allston, Mass. A memoir of Sweet was read by C. M. Spofford at the December meeting of the Boston Society of Civil Engineers, of which Sweet had been a member for about seven years. Professors Porter and Spofford were the committee of that society to prepare the memoir.—Announcement was made in October of the engagement of Miss Caroline T. Hemenway, daughter of Mrs. C. P. Hemenway, of Beacon Street, Boston, and Manchester-by-the-Sea, to Charles Wilson Taintor. Since coming back to America from London, Taintor has made a short business trip to Arizona and Southern California, from which he returned to Boston early in December.—William C. Whiston, who has been engaged in newspaper work for two or three years, is on the staff of the *New York Commercial* at 8 Spruce Street, New York City.

1894.

PROF. SAMUEL C. PRESCOTT, *Sec.*, Mass. Inst. of Tech., Boston.

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J. E. Thropp, Jr., has gone to Donora, Pa., to take charge of the new blast furnace plant of the Carnegie Steel Company.—J. C.

Perry died of consumption at La Junta, Col., Aug. 31, 1904, after an illness of two or three years, most of which time he spent in New Mexico in the hope of recovering.—Charles H. Paul has a position in the United States Reclamation Service, and is located at Denver, Col.

1895.

GEO. W. HAYDEN, *Sec.*, 493 Warren Street, Roxbury, Mass.

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François E. Matthes is spending the college year at Harvard University, taking post-graduate work which he could not get elsewhere.—H. K. Barrows, formerly of Bangor, Me., announces that on and after Jan. 1, 1905, the office of the District Hydrographer for New England (of which he is the engineer) will be at 6 Beacon Street, Boston, Mass.—Luther Conant, Jr., of New York, has been appointed as special examiner in the Bureau of Corporations, Department of Commerce and Labor. Mr. Conant for some years has been financial editor of the *Journal of Commerce and Commercial Bulletin* of New York.—From the Norwalk *Daily Reflector*, Jan. 9, 1905:—

Charles Goodnow Williams, son of Mr. Theodore Williams, of Norwalk, Ohio, died January 8, of pneumonia, at three o'clock at Phoenix, Ariz., where the deceased had made his home for the past eight years.

Charles G. Williams, who was the third son of Theodore Williams, was born at Norwalk, April 3, 1871. After attending the public schools for a number of years, he entered Riverview Military Academy at Poughkeepsie, N.Y., from which institution he graduated in 1891. He then entered the Massachusetts Institute of Technology at Boston, graduating from there in 1895. For two years he was engaged in the construction of macadamized roads on Cape Cod, Nantucket Island, and in other parts of Eastern Massachusetts. While engaged in this work, he contracted a severe cold, which undermined his health, and eight years ago he went to Phoenix, Ariz. For two years he was the efficient manager of the Ford Hotel in that city, and while in that position he met Major Davis, of the United States Engineer Corps, who was in the territory looking into the construction of irrigating canals, and, being impressed with Mr. Williams's learning as an engineer, engaged him in that work. For the past two years he had been assistant

engineer of the reclamation service of the Geological Survey Department of the Interior, and had sole charge of the construction of the Salt River Valley irrigating plant, which included the construction of a great dam and the building of a canal ninety miles long between Phoenix and Globe, Ariz.

November 1 he obtained a thirty days' leave of absence, and went to California on a pleasure trip. While there, he caught cold, which developed into pneumonia.

1896.

EDWARD S. MANSFIELD, *Sec.*, 70 State Street, Boston, Mass.

M. L. Fuller is now the chief of the Eastern Section of the Division of Hydrology of the United States Geological Survey. The area under his charge includes all of the States east of the Mississippi River and those bordering that river on the west. During the summer he has had assistants working on the artesian waters in nearly every State of the Union. Personally, he has been engaged in investigations in New England, Michigan, and Missouri.—On the 6th of October, 1904, Joseph Harrington was married to Miss Cora A. Dunlap, of Chicago, Ill. They are now residing at 605 West Sixty-fifth Place, Chicago, Ill. Harrington is the superintendent of the Green Engineering Company of Chicago.—Geo. E. Merryweather is president of the new firm of the Motch & Merryweather Machinery Company, succeeding Marshall & Huschart Machinery Company, with offices at 24-26 Lake Street, Cleveland, Ohio.—Joseph Driscoll and Miss Martha E. O'Connell, of Jamaica Plain, were married on the 19th of October last in Jamaica Plain. They are now living at 19 Edgehill Road, Brookline, Mass.—Walter M. Stearns, superintendent of the Fort Wayne Electric Company, is now living at 706 West Berry Street, Fort Wayne, Ind.—J. W. Stickney, of the Central Telephone Company, is now located in Anderson, Ind. A. L. Drum is also living in Anderson, Ind.—Chas. A. Wentworth, civil engineer in the United States Navy, has been transferred to the United States Naval Station at Guantanamo, Cuba.—John C. Scovel, Jr., has accepted the position of mechanical engineer with the Refrigerating Machine Branch of

the Creamery Package Manufacturing Company of Chicago, Ill. They are located at 875 Jackson Boulevard.—Henry K. Sears is now teaching branches of science in the high school at Taunton, Mass.—L. L. Lamborn, until recently a student in the St. Lawrence University, and now practising law in Brooklyn, N.Y., has just published a 240-page book on Cotton Seed Products, treating of cottonseed, the treatment for the obtaining of its products and their utilization in the arts. He has also in press a 600-page book on American Soaps, Candles, and Glycerine.—Eugene H. Laws is now associated with the Old Dominion Copper Mining and Smelting Company of Globe, Ariz.—W. H. McAlpine has left Cincinnati, Ohio, and is now located in the United States Engineer's office at Frankfort, Ky.—R. E. Bakenhus has been transferred to the United States Naval Training Station at Newport, R.I.—Mrs. H. W. Chamberlain has accepted a position in the library at Columbia University, New York City.—Geo. Fresch, Jr., has gone into business as a grain merchant, and is located at 101 Chamber of Commerce, St. Louis, Mo.—Joseph H. Knight is associated with the new law firm of Moody, Burdett, Wardwell & Snow, of 84 State Street. Attorney-general Moody has just taken up again the practice of law.

The design of Kilham & Hopkins of this city for the Salem high school has been named by Professor Francis W. Chandler, of the Massachusetts Institute of Technology, the expert appointed by the Salem High School Commission to examine the sixteen competitive plans submitted by prominent Boston and Salem architects; and the commission has accepted Professor Chandler's report.

The building, which will be of colonial architecture, will be about 150 by 240 feet, three stories and basement high, and will contain class-rooms, laboratories, etc., for more than 800 scholars. There will be an assembly hall on the ground floor, with 1,050 separate chairs, unusual exit capacity, and so arranged that it can be used by the public without opening the rest of the building. The plan is symmetrical, all of the elevations being of pleasing design, and is especially adapted to the irregular plot. The basement provides luncheon, bicycle, toilet rooms, etc.; a gymnasium, 20 feet high, and fitted with a running track of 20 laps to the mile.

The working parts of the building will be arranged to give the greatest ease of administration and greatest economy of coal consumption.

The cost is estimated at about \$175,000.

An important feature of the design is that the main building, exclusive of the assembly hall, can be built without disturbing the present school building, so that the question of accommodating the scholars during construction is provided for.

James C. Hopkins is a '96 man; and his partner, W. H. Kilham, is also of Tech, class of '89.

1897.

JOHN A. COLLINS, JR., 74 Saunders Street, Lawrence, Mass.

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A number of the members collected at the Technology Club on Wednesday evening, December 21, for the dinner as announced in the circular letter. Those present were: H. D. Jackson, A. W. Jackson, Humphreys, Healy, Howard, Breed, Rhodes, Olin, Hopkins, Blood, Geo. Fuller, Carty, W. O. Sawtelle, Collins, Fairbanks, and Elson. Dinner was served at 6.30 P.M. at a cost of sixty cents a plate. After the dinner the men adjourned to a room on the third floor, where Mr. James P. Munroe, who was the guest at dinner, spoke upon the merger question, naming the different points of view from which the subject must be considered, and outlining the argument in each case. He made plain to those present just what the Institute would gain by a union with Harvard, and also what sacrifices she would have to make to gain what, after all, was not such a tremendous sum of money. The whole meeting was very informal, and much discussion followed. It was the sentiment of those present that the men ought to get together for such informal times more often, as, for example, once every two months. Healy, for instance, for the first time since graduation, had the opportunity of meeting the boys again. He is with the United States government, and, as a special work, is the engineer in charge of the erection of the new United States Mint in Denver. Fortunately, he was East, and was a welcome addition to the group. So it would be with others, perhaps, were we to have these little informal times.—J. R. Daniells, who, by the way,

is secretary of the Technology Club of Philadelphia, writes that Krisker, Eaton, and Hunnewell are all active members of the society.—Atwood, who has been at work on the Torresdale filter plant, has gone to Pittsburg, since the former work is nearly completed.—L. S. Cowles reports the birth of a son, Addison Cowles, on Oct. 28, 1904.—George Oscar Sawyer Pettee, son of Pettee, Course V., was born on Oct. 29, 1904. Pettee is State chemist, with the Hartford Laboratory Company, at Hartford, Conn.—A. C. Lamb sends word that he has a son, Roland Augustus Lamb, born June 17, 1904.—Blood, Course I., sends the pleasing information that he has a son, Donald Kimball Blood, born May 24, 1904, and further writes, "He has the 'Tech' yell down cold, and in a few more lessons will be able to do up a Boston 'cop' with his bare fists."—H. D. Jackson is lecturing twice a week at the Institute on Street Railways. He is engaged in expert engineering work, making a specialty of rail bond testing, electrolysis, and power distribution.—Charles Ewing is associated with George S. Chappell as the firm of Ewing & Chappell, architects, 501 Fifth Avenue, New York.—W. O. Sawtelle, at present located at Tech in the Physics Department, writes of a son, Egerton Burpee Sawtelle, born May 1, 1904. He says he is to enter the Institute in the fall of 1922, class of '26, and that consequently he (Sawtelle) is decidedly opposed to any merger.—William H. Leach, Jr., reports a daughter born on April 29, 1904.—The men may think I am a bit slow in getting such information into print, but if the members do not keep me posted, it is surely not the fault of the secretary.

1898.

C.-E. A. WINSLOW, *Sec.*, Hotel Oxford, Boston, Mass.

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W. R. Strickland is now in the main office of the New York Central at 42d Street.—E. F. Morrill has moved from Brooklyn to Springfield, Ill., where he may be addressed, care of the Central Union Telephone Company.—J. N. Goddard became the happy father of a daughter, Mary Elizabeth, on September 22.—E. A.



Weimer was a prominent exhibitor of special machinery for blast furnaces and smelting works at St. Louis, and wrote to the secretary in October:—

While visiting the World's Fair, I would be pleased to have you call at Space 72-B, Mines and Metallurgy Palace, and examine my exhibit. You will find one of my patented 200 cubic foot Steam or Air Dumping Cinder Cars in operation with all the latest improvements, including a safety attachment to prevent the too rapid tilting of the ladle, also my Flexible Copper Hose connections for Tuyeres and Water-cooled Blocks.

—L. J. Seidensticker has accepted a position with the Keystone Leather Company of Camden, N.J., and his address is 413 Penn Street, Camden.—M. E. Taylor passed a civil service examination for the position of draughtsman in the Ordnance Department last September, and in December left the Blake Pump Works to go to the State, War, and Navy Building, Washington. His home address is 1322 Whitney Avenue.—Durand Churchill, of Chicago, is to furnish 5,742 lockers to the South Park Commissioners for twenty new public gymnasiums.—R. M. Vining has accepted a position with the Dennison Manufacturing Company, and his address is now 11 Summit Street, South Framingham.—The secretary of '98 was elected a member of the executive committee of the Alumni Association at its annual meeting, December 23. The '98 men present at the dinner were Ayres, Godfrey, Coburn, Winslow, and Thompson.—E. F. Russ announces the birth of a son, John Rodman, September 22.—W. G. Zimmermann is now constructing agent for the American Bridge Company of New York, Western Division, with his office in Monadnock Block, Chicago.—R. W. Pratt contributes an admirable and exhaustive study of the Sewage Purification Plants in Ohio to the Eighteenth Annual Report of the Health Board of that State.—Up to the close of 1904 the class of '98 had contributed \$8,200 to the Technology Fund, from fifty men. There are still five classes ahead of us in number of subscribers and five ahead of us in total subscriptions. This is not right.

1899.

DR. MILES S. SHERRILL, *Sec.*, Mass. Inst. of Technology, Boston.

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The secretary has several marriages to announce in this number of the REVIEW. On Wednesday evening, October 26, Hervey J. Skinner was married to Miss Grace May Elliot at Wakefield, Mass. Clifford Swan was best man, and Miles Sherrill officiated as one of the ushers. Miles Richmond and Harry Mork also helped give the bride and groom a good send-off. The couple after a trip as far south as Washington returned to Wakefield, where they are residing at the groom's home on Chestnut Street. For the last few years Skinner has been connected with the firm of Little & Walker, chemical experts of this city.—Frederick William Caldwell was married on October 27 to Miss Elva May Bennett, of Schuylerville, N.Y. Mr. and Mrs. Caldwell reside at 2000 Union Avenue, East Schenectady, N.Y.—Also Frederick Willis Snow was married the first of November to Miss Maud Graham, of Lynn, Mass. Mr. and Mrs. Snow will be at home in Great Falls, Mont., after March 1.—Asa Waters Grosvenor was married to Miss Gertrude King Hanna on Thursday, October 27, at Fort Wayne, Ind.—Walter O. Adams has accepted a position with the Ford Motor Company of Detroit, Mich.—Thomas Todd has recently returned from a trip to Norway and Sweden.—E. T. Hildreth is president of the Boston Artificial Rubber Company.—H. Philip James is the proud father of a second little daughter, Esther Cornelia, born November 10. Her sister Margaret, of Tech reunion fame, is growing rapidly, and is very strong and well.—Roland W. Stebbins is superintendent of construction with the Springfield Gas Light Company. Quoting from his letter:—

We are building a retort-house in which to install five benches of nine inclined German retorts, and we have already installed a million-foot water gas set. Besides this, we are laying out a very extensive coal-handling scheme, and making many constructional changes in the plant. I assume that this work will cover a period of at least eighteen months. I am sent to different gas and electric plants to do engineering work by Mr. F. P.

Royce, an old Technology man. This work is intensely interesting, and has the advantage that, between jobs, I get away for trips. I went to Porto Rico last year to visit Robert Frazer, '99, who is planting sugar at Aguire. Last fall I had a ten-thousand-mile trip through the West, stopping at Louisville to see George A. Robinson, '99, who is manager of a woollen mill there.

—R. F. Bennett is with the firm of W. F. Bennett & Son, contractors, Portland, Me. Their business consists principally of heavy wood work, pile driving, and wharf building, occasionally concrete work. He writes:—

We find it necessary to increase and improve our plant every year to keep up with the times. We have all we can do all the time. This keeps me as busy as I was at Tech, and that is saying a good deal.

1900.

GEO. EDMOND RUSSELL, *Sec.*, 404 Stewart Avenue, Ithaca, N.Y.

The following letter from A. L. Hamilton, Fairbanks, Alaska, dated Sept. 30, 1904, and addressed to the Secretary of the Institute, was only recently received:—

I am very anxious to get a copy of the last catalogue giving the occupations and geographical distribution of the graduates of the Institute. My address for the future is Fairbanks, Alaska.

I have been in the district about three months, and am located here permanently. I am mining on the creeks, and the prospects are excellent.

The district is turning out even better than the most sanguine expectations, and the output for the season is surprisingly large. It is estimated conservatively at \$1,250,000. The district has had an influx of people this summer, so that there will be the same circumstances to overcome that were troubling the miners last winter.

I am speaking of the shortage of supplies. Even now it is impossible to get all the essentials when buying the winter's grubstake.

The creeks upon which most of the development work has been done are Cleary, which promises to rival the most productive creek in the Klondike, and Fairbanks, which also is producing a large amount of gold. The

former is constant in its values in the pay streak, while the latter is more spotted and uncertain. Many predict that Cleary Creek will produce as much gold as Eldorado in the Dawson country.

Miners have been working under the most disadvantageous conditions ever since pay has been located. Supplies, machinery, freighting, and fuel have been high, and still continue to be. Then, again, laborers have been getting \$1 an hour, and the price has not as yet been lowered. Of course, this does not include board. On some of the larger properties pay has ranged from \$4.00 to \$7.50 per day and board.

Taking everything into consideration, it is surprising that as much has been produced as above stated.

There are one or two elements which are holding back the country more than people on the outside realize. Power of attorney has been used to its full extent here, and individuals own any number of claims, which they are holding at fabulous prices, and which they are unable to do any work on themselves from lack of capital. Then, again, the size of the claims is exceedingly large, and bedrock, especially on Cleary, very deep. This makes prospecting and development work generally very expensive, and consequently there is no more done than necessary.

On the wildcat creeks, in a great many instances, bedrock is also very deep; and it will take a considerable amount of time and money to prove the absence or presence of pay in them.

I have rather run on at random, assuming that you are possibly interested in the district. I have had one or two clippings from the *Transcript*, which Professor Lodge has sent me, and in one instance the information in them was entirely wrong.

I would thank you very kindly if you would send me such information regarding the graduates, and the progress of the Institute itself, as you may have for distribution among the alumni. I am a good ways away from Boston, and I want to know whether I am a graduate of Tech, Harvard, or just an ordinary nonentity.

—Joseph A. Draper recently announced that he had opened an office for the general practice of law in the Easton Building, 15 State Street, Boston.—Arville C. Redman was married to Miss Edith A. Rowan at Kansas City, Mo., on June 18, 1904. They will reside in Lawton, O.T., where Redman is engaged on irrigation work for the Geological Survey.—Benj. R. Johnson has left the

Patent Office, and hung out his shingle as counsellor<sup>r</sup> in patent causes at 605 Seventh Street, Washington, D.C.

1901.

E. B. BELCHER, *Sec.*, Malden, Mass.

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The class of '01 has held two important class meetings during the month of November. The first, on November 9, was called for a discussion of the Tech Fund, its aims and its history; and we were very fortunate in having with us both the chairman and the secretary of the Income Fund Committee. Mr. Morss urged every man to support the fund, whether or not he was a "merger" man, and to make a point of interesting one's personal friends in the work. Mr. Wood gave us an account of what had been accomplished to date and what might be expected if every one made the question of the fund a personal one. The meeting of November 30 was devoted to a discussion of the merger question; and we were fortunate in having with us Dean Burton, Mr. Thomas of the Fund Committee, and Mr. Forbes, secretary of 1898. Resolutions were adopted on the death of E. C. Harper, Course I., and it was voted that a copy of the same be sent to the bereaved family.—E. F. Lawrence is working hard on an invitation competition for a design for a court-house for Cumberland County, Maine.—I. L. Parke is the father of a year-old boy, which is probably news to most of the class.—James Hamilton has returned from abroad.—G. P. Shute, Course X., Columbus, Ohio, reports a large number of Tech men in the vicinity and plenty of Tech spirit.—Wilde, Course I., was home for the holidays, and reported plenty of work in the Pittsburg region.—Born December 3, to Mr. and Mrs. Charles F. F. Campbell, a daughter. Mr. Campbell is superintendent of the Massachusetts Association for Promoting the Interests of the Adult Blind.

1902.

CHAS. W. KELLOGG, JR., *Sec.*, Edison Electric Illuminating Company, Brockton, Mass.

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A report of the arrival of the "class boy" has reached the secretary since the last publication of the REVIEW. The report states that he has come to bless the home of H. A. Ames. The lad is named George Henry Ames, and was born on June 12, 1904.—Patch has been drawn north by an affair of the heart, and has changed his place of business from the Newport News Shipbuilding and Dry Dock Company to the Fore River Ship and Engine Company at Quincy, Mass. He has announced his engagement to Miss Nellie I. Keene, of Stoneham, Mass.—Bourneuf is now in business at 1 Sudbury Street, Boston.—It is a sad duty to chronicle the death of Miss Eleanor P. Rathbun, which occurred in Morenci, Ariz., on Nov. 21, 1904. Miss Rathbun had been obliged to leave her work, and seek the climate of Arizona in hopes of recovering from tuberculosis; but the disease could not be cured. Since graduating from the Institute Miss Rathbun had been a teacher in the Zoölogical Department of Wellesley College, and latterly assistant in Biology at the Institute. She had written two papers which had been read before the International Association of Science.—On Nov. 22, 1904, a Beer Night was held at the Tech Union, at which about twenty-five members of the class were present. Mr. Morss addressed the meeting on the subject of the Technology Fund, and furnished some valuable information regarding it. At this time (Dec. 15, 1904) the subscriptions to the fund from our class amounted to \$1,780. That is about \$356 per year for the five years, or only about \$1 per capita per year for the class. This is a mighty poor showing, and should be greatly improved before the next issue of the REVIEW.—The following clipping is from the Salt Lake *Tribune* of Dec. 9, 1904:—

Louis S. Cates, the well-known mining engineer, who has shown his metal, was yesterday appointed superintendent of the Boston Consolidated

Mine at Bingham by Samuel Newhouse, the appointment to take effect at once.

Although a young man, Mr. Cates has had much valuable experience since he graduated from the Massachusetts Institute of Technology. He gained his spurs during two years spent in Mexico, where he operated a lease on the famous Palmilla mine, owned by Pedro Alvarado, the eccentric millionaire, who has offered several times to pay the national debt of Mexico. Leaving this position to join the staff of Mr. Newhouse a year ago, he has shown the capacity which has won him deserved promotion.

1903.

WALTER H. ADAMS, *Sec.*, 22 Dix Street, Winchester, Mass.

S. N. Mason was married to Miss Lena Blanche Lawrence, of Wakefield, Mass., on Sept. 12, 1904. He has since then accepted a position in Lawrence, Mass.—During the summer L. H. Lee (VI.) met with a serious accident, and he has only recently come out of the hospital. He hit some high voltage transmission wires, and was seriously burned. By the time this is in print he expects to be back again at his work. He is now superintendent of a power plant in Cheshire, Conn.—Ancona (II.) is with the Vermont Marble Company at Proctor, Vt. He is working in the engine department.—Humphrey (II.) and Sibbett (II.) are with the Link-belt Engineering Company in Philadelphia.—Loughlin (XII.) is in New Haven, Conn.—Morse (I.) has been sent to winter quarters in Denver, Col., where he expects to remain until spring.—Tolman (X.) has returned from Germany, and is now an assistant in the Chemical Engineering Department. He says that he had a good time while he was abroad.—F. W. Davis (I.) has quit civil engineering work, and gone into business in Boston.—Drake (XI.) is now working for the State Board of Health at the State House.—Probably few 1903 men have had a more exciting time in the last year and a half than Goodwin (III.). He has been in Telluride, Col., where the exciting labor troubles have been taking place. Part of the time he has been doing watchman's duty with the other engineers, as they

were the only men who could be relied upon. He took part in the deportation of the union miners about seven or eight months ago, and has had a very exciting time, on the whole. He says he likes it, and expects to return to Colorado soon, and Barnaby (III.) expects to go with him.—Comer (XI.) is now sales manager with the Lowell Weaving Company at Lowell, Mass.—On the evening of November 16 an informal dinner was held at the Tech Union. Only thirteen members of the class were present. The members of the Class Income Fund Committee were present, and described the work on the fund and the state of the Harvard-Tech merger, alliance, union, or treaty, as it is variously called, as it was at the time. After that there was an informal discussion of the entire matter, in which everybody took part. Owing to the small number present, every one felt free to say what he pleased. With regard to the work of the Income Fund Committee, the notices sent out by the class subcommittee, consisting of F. W. Davis, chairman, and W. H. Adams and Taylor, have met with a very good reception from all members of the class. While the subscriptions are small in amount, they have been fairly large in number; and I think our class holds its own when compared with the other classes. In the next REVIEW I will give an account of the class data on the Income Fund.—It is my sad duty to record the first death in our class since graduation. A few days ago I received notice of the death of William Chaille Martin at College Station, Tex., on Nov. 20, 1904. Professor Talbot writes of him:—

William Chaille Martin, of the class of '03, died November 20, after an illness of a few days. He was Associate Professor of Industrial Chemistry at the Agricultural and Mechanical College of Texas. His instructors and associates at the Institute will recall his frank, cheerful manliness and his earnestness of purpose as a student. They will be glad to know that he had already become the most popular instructor at his Alma Mater, and was regarded by his colleagues as a man of much promise as a teacher, although it was known to be his purpose to enter the technical field after another year of teaching. His friends in Boston and in Texas are saddened at the untimely ending of a life that seemed to be developing into strong, helpful manhood.



—Milton C. Dunham has charge of the cyanide plant and does the assaying at the Polita Gold Mining Company at Polita, Cal.

1904.

ARTHUR W. BARTLETT, *Sec.*, 41 Monroe Street, Newburyport, Mass.

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Edwin F. Albright is located in Washington, D.C., with the Southern Railway Company.—H. L. Stevens and R. B. Morse are in the Bureau of Construction and Repair of the Navy Department at Washington.—Arthur O. Roberts is in the Department of C. & R. at the Washington Navy Yard.—Guy W. Eastman is laboratory assistant in the Bureau of Standards at Washington. He was married on Dec. 10, 1904, to Miss Charlotte Fuller, of Norwich, Conn.